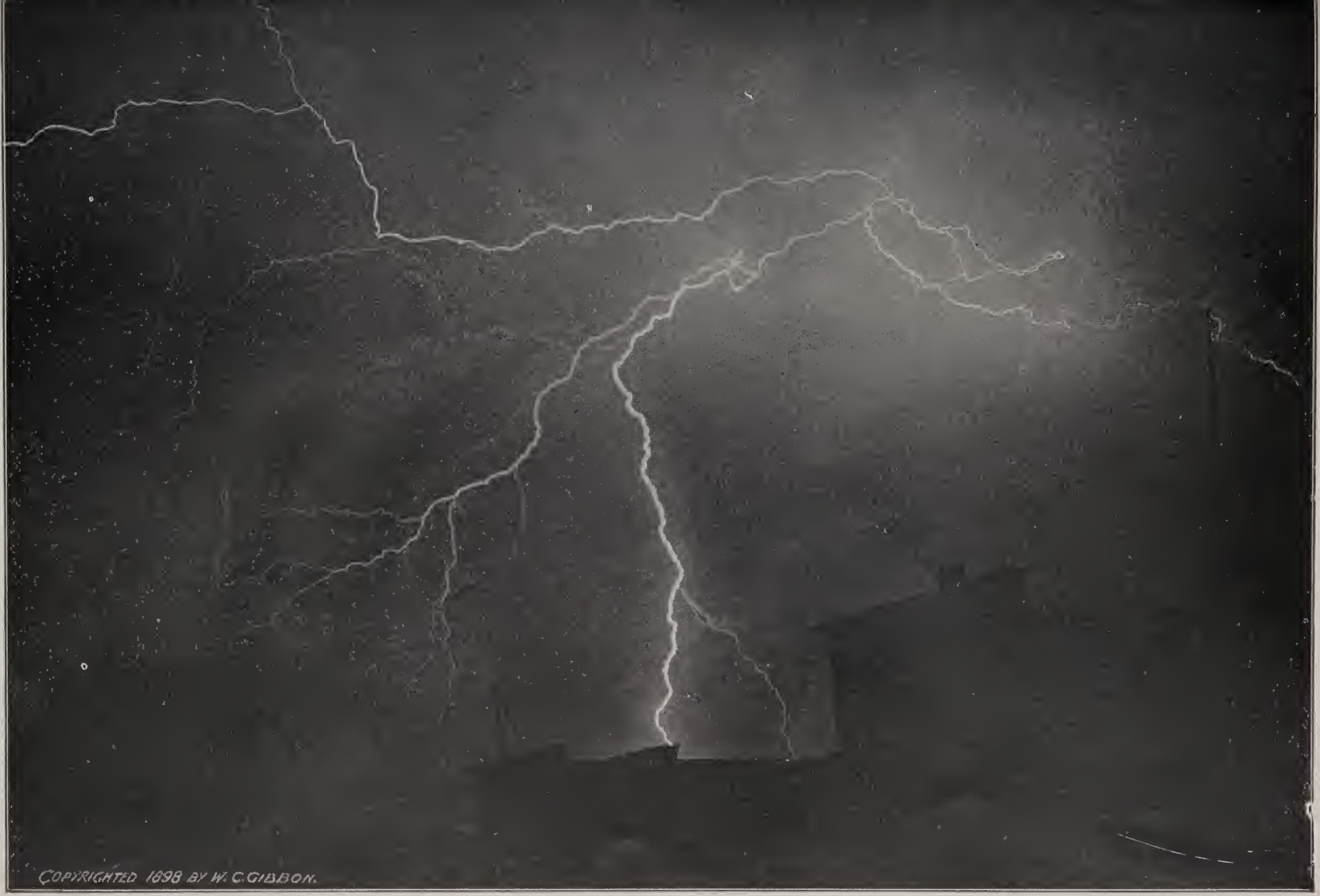

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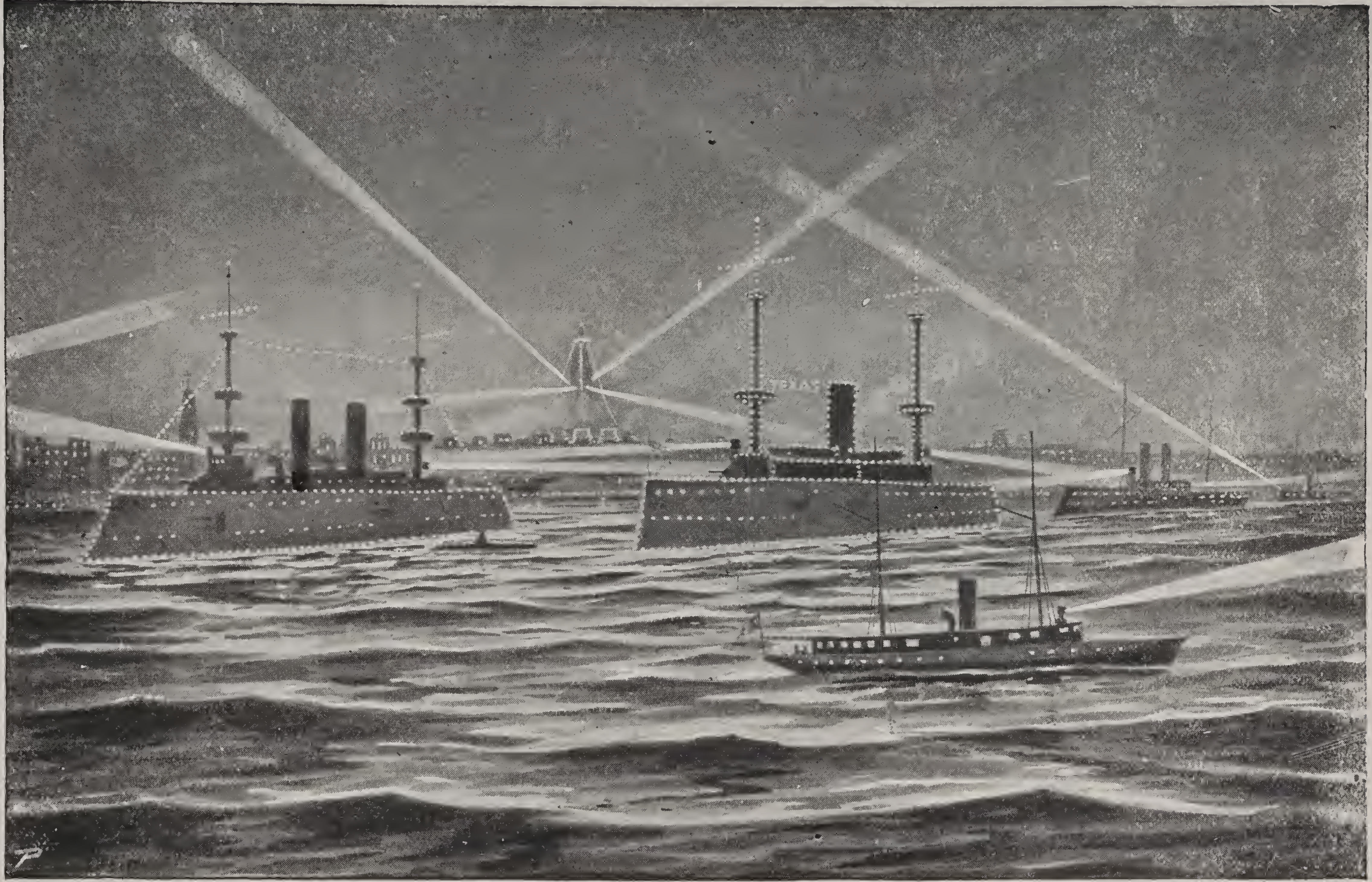
THOMAS A. EDISON IN HIS LABORATORY.



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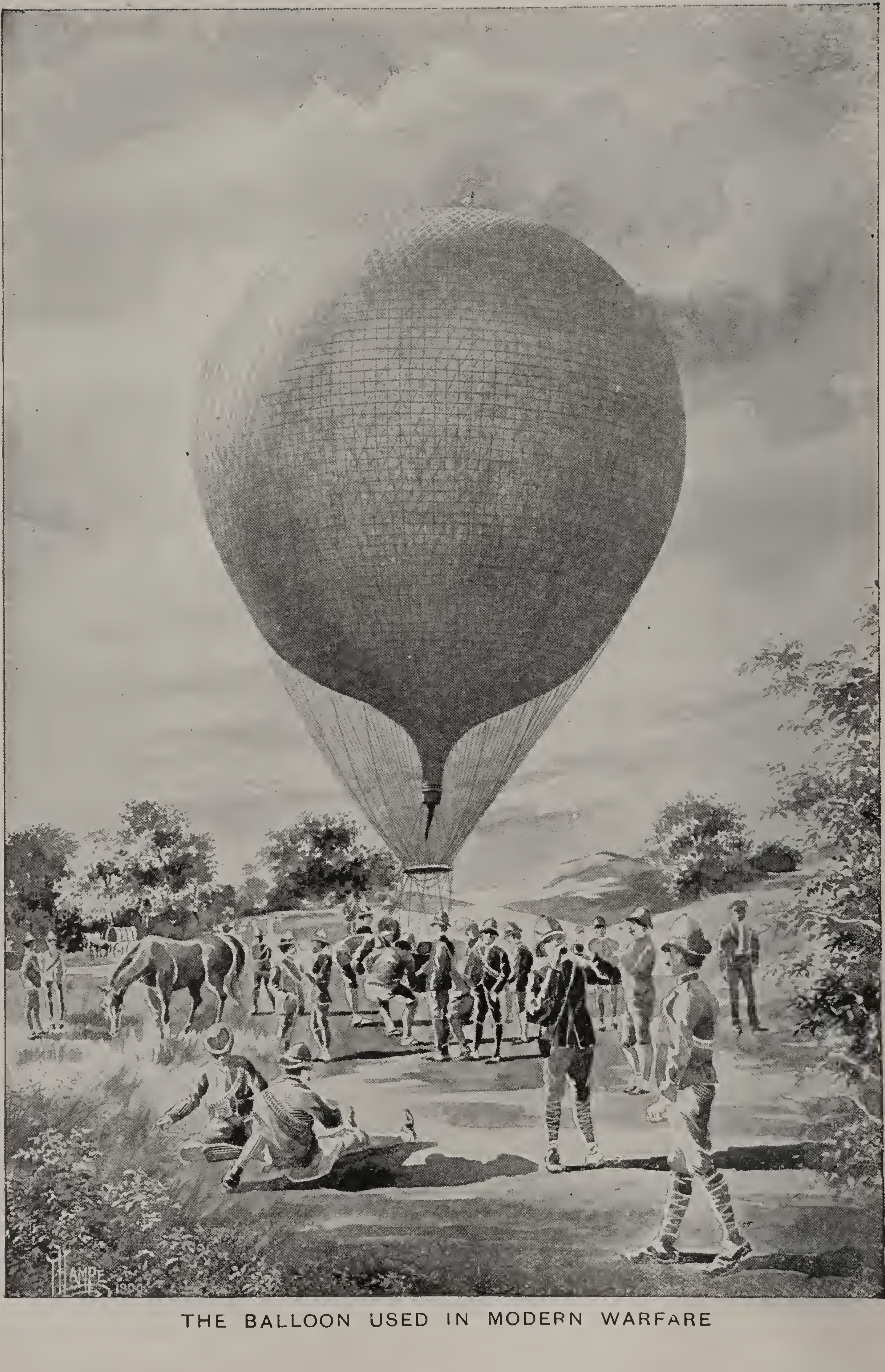
A STRIKING EFFECT WAS PRODUCED BY SEARCHLIGHTS ON THE WAR VESSELS AND ON THE CITY HALL



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PREFACE.

OUR grandparents were wont to tell us of the awe and skepticism that everyone expressed when, during the last century, steam was first used as a motive power, and by means of electricity the first message was flashed over Morse's telegraph. But the era of marvelous discovery and invention, of stupendous enterprises and fabulous fortunes was, as it were, yet in its infancy. To-day we are on the threshold of a new epoch: we have ushered out the wonderful Nineteenth Century, and words fail us when we think what new marvels are yet to be brought forth from bounteous nature by the aid of the hand and brain of Man.

Sufficiently awe-inspiring is it to gaze about us at the inventions of the last twenty years and understand in what a grand and glorious age we are living. History tells us of the Golden Age of Greece, of the fabulous wealth of the Orient, of the marvels of the armies of Xerxes and of Cæsar, of the brilliancy of the all-absorbing Roman Empire, and of the later years when Shakespeare lived, and artists, poets, and wise men were aided by rich gifts from Kings and Queens and encouraged in their search for wisdom.

The discovery of America was a wonderful history maker, and accomplished almost in a day what years of careful study could not have proved. But what are we to say of this, the most marvelous country of them all?

To-day we have so subdued nature that we have harnessed the great Niagara, and hourly convert by means of great turbines many thousands of volts of electricity to be used in aiding the ways of commerce. By means of the weirdest of all discoveries,—the X Rays,—we can now gaze in contemplation on the beatings of the human heart, secure within its fortress of muscle and ribs.

Air has been reduced to liquid substance, so cold that mercury when brought in contact with it is frozen solid as rock. The wizards of electricity are at work perfecting the wonderful wireless telegraph, and means of transmitting electrical power for light without wires is expected soon to be achieved. To-day we are able to photograph moving objects, and reproduce them life-like in form and size and graceful motion.

Such are some of the wonders wrought within recent years; we dare not scoff at what the future may bring forth. What we should do, however, is to keep abreast of the times,—to know of the age in which we live. And it is no easy task, when one must glean from this newspaper and from that magazine, and catch fragmentary pieces of a subject here and there and try to retain them in this busy hustling and bustling life long enough to gain a fair understanding and form opinions of them.

With this thought in view the publishers of this magnificent volume have spared no expense to present to the intelligent reading public a comprehensive and thoroughly up-to-date encyclopædia of the latest inventions and improvements in the scientific and mechanical world ; the work is primarily intended for busy people who desire facts, yet who wish to be spared the labor of long and unsatisfactory researches through libraries, museums, and histories.

In the space alloted to science in this delightful book are described the latest marvels : liquid air, the wireless telegraph, the new uses of the X Ray, the advance in experiments toward the perfect air ship, telegraphing pictures, and many other wonderful feats never before dreamed of.

Then follows a number of very interesting accounts of inventions along the mechanical line, though many partake of the nature of the scientific. Here the reader learns that the dreams of Jules Verne have come true, and that man may now safely travel the bottom of the sea. Besides submarine boats, there are here treated such subjects as battleships and modern war engines, moving pictures, great engineering feats, automobiles, bridges, canals, monster printing presses, type-setting machines, iron and steel mills and foundries and stereotyping processes. The modern tall building or " sky scraper " is described in its various stages of construction.

And after these history making machines comes some of the history they have changed. Here are to be read and seen portrayed in picture the travels and discoveries of the wise men of the world ; the acquisition of the new territory of the United States : Porto Rico, Hawaii and the Philippines ; the great Peace Conference, called by the Czar of all the Russias ; the war in South Africa, our marvelous growth in commerce and shipping, the cattle industry, and the stock yards at Chicago. Here we shall learn how great newspapers are made and circulated, and how trusts are organized.

Many young men and women are embarrassed by responsibilities they cannot throw off. He or she may not be able to attend college or go to the great cities for learning ; but no one need be ignorant with such mines of information as this book lays before them. Indeed, they who will not learn may go their poor deluded ways ; but those who are struggling upward and onward, striving to learn and to know, to gain knowledge, and with knowledge power, will find in the following pages a way open for higher, better and nobler achievements.

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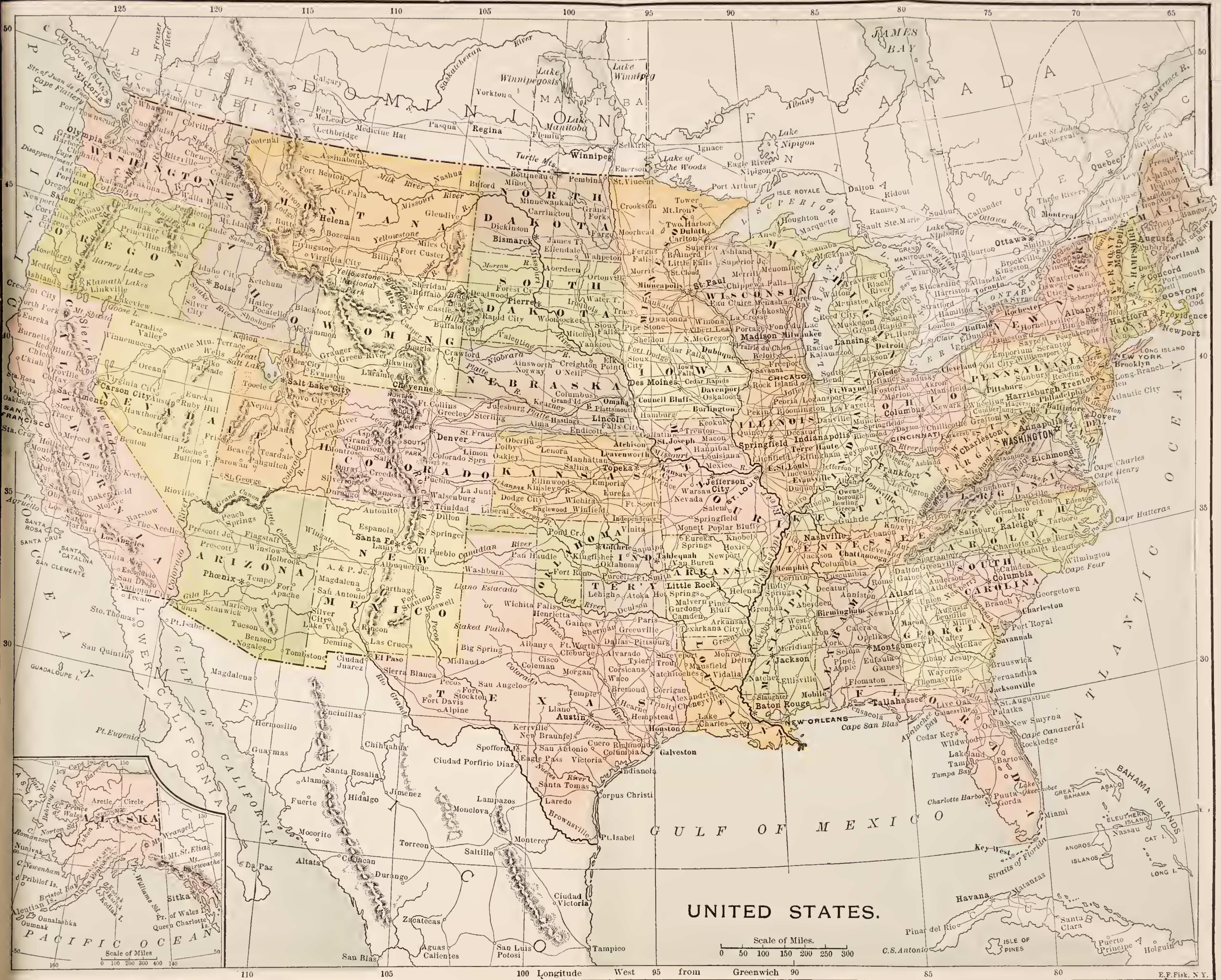

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EDUCATION

The Training of Mind and Body

AMONG the wise and pithy sayings of one of our best known modern writers is this: If a man empties his purse into his head, no man can take it away from him. An investment in knowledge always pays the best interest.

It is by diligent attention to this rule that the highest success is gained. It is impossible to have the noblest type of man, physically, intellectually or morally, without education. An uneducated ploughboy cannot reach the commanding heights of the widest influence; with education he may rise to the highest position his country can bestow.

The biographies of the greatest statesmen, scholars, men of letters, philosophers and others who have gained distinction, invaribly represent them as possessed of an eager thirst for knowledge. Sir Isaac Newton was in the habit of spending whole nights in the study of astronomy and the laws that govern the heavenly bodies. Without such close application he could not have made those immortal discoveries which have been the wonder of all thoughtful minds from his time until the present.

It is the observation of one of our modern writers that a human being is not, in any proper sense, a human being until he is educated. Thus his slumbering faculties are aroused. The magnificent displays of knowledge dawn upon him as the morning light brings beauty and fruitfulness to the earth. The word education means to train, to instruct, to awaken our faculties to action; or, taking the word in its primary sense, it means "to draw out." It aims at the growth and highest possible culture of the whole man, and the most valuable means for securing this grand result are found in books of useful knowledge and information. These are the tools with which the rough block is chiselled into symmetry and beauty.

The fruits of the earth do not more obviously require labor and cultivation to prepare them for our use and subsistence, than our faculties demand instruction and regulation in order to qualify us to become upright and valuable members of society, useful to others, or happy in ourselves. We must be disciplined and trained.

Education is a friend which no misfortune can estrange; a companion that never becomes wearisome; a light that never grows dim; a solace that never fails. It is the helper of the poor and unfortunate, the handmaid of genius, an introduction abroad, and an ornament in every walk of society. Without it, what is man—what can be but an untutored savage?

What sculpture is to a block of marble, education is to the mind. The philosopher, the saint, the hero, the wise, the good, the great, often lie hidden and concealed in some unnoticed individual, which a proper education might have disinterred and brought to light.

The True Motto.

Education begins with life. Before we are aware the foundatioms of the future structure are laid. Busy pursuits, the struggle for daily bread, and the toil that cannot be escaped, crowd out the opportunity to engage in the pursuit of knowledge, but if we take the correct view of this most important matter, we shall hold that education is never finished, that there is always something new to learn, that the highest summit has not been reached, and we shall still, in the spirit of Longfellow's "Excelsior," press upward with a noble resolve, and a determination that is daunted by no difficulty or failure.

Too apt are we to take a narrow, limited view of self-training. One boy is educated to be a bookkeeper; another, to be a draughtsman; another, to be a stenographer; another, to be an electrician; another, to be a lawyer or journalist. It is true that special training is needed for special pursuits, and no less true that the whole man needs to be educated, whatever may be the subsequent calling to be followed. All other training is like lopping off the branches on one side of the tree and causing them to grow only on the other side—very good branches, perhaps, but very misshapen tree.

Hear what Daniel Webster said: Know edge does not comprise all which is contain in the large term of education. The feeling are to be disciplined; the passions are to b restrained; true and worthy motives are t be inspired; a profound religious feeling is t be instilled, and pure morality inculcate under all circumstances. All this is com prised in education.

Said Washington—and our entire histor since his day has proved the sagacity of hi remark: Promote, as an object of primar importance, institutions for the general dif fusion of knowledge. In proportion as th structure of a government gives force t public opinion, it is essential that publi opinion should be enlightened. The Fathe of his Country was firm in the convictio that ignorance should have no place among a free people.

An Old Legend.

There is an old fable in classical Mythology which pictures Hydra as a serpent crawling in the slime of marshy Lerna—a monster with many heads, anyone of which, if cut off, was replaced by two others unless the wound was cauterized. The horrid creature was slain by Hercules; this was one of the giant's famous achievements. No less true is it that ignorance is a hydra with a thousand heads, ugly, dangerous, demonish, and the Hercules that alone can slay it is that knowledge which comes from enlightened education.

One of our martyred Presidents said: Next in importance to freedom and justice is popular education, without which neither freedom nor justice can be maintained. This means that more than banks, railroads, factories, commercial structures thirteen stories igh—more than all the sails of commerce nd all the ploughs that turn up golden harests from prairies, is that thorough training hich fits the citizens of a free commonealth for their duties and responsibilities.

William Penn, writing to his wife concerng their children, said: For their learning liberal. Spare no cost; for by such parmony all is lost that is saved; but let it be useful knowledge, such as is consistent with truth and godliness, not cherishing a vain conversation or idle mind; ingenuity, mixed with industry, is good for the body and the mind, too.

Thus, have the fathers and founders of our nation urged, insisted upon, and demanded, all the advantages of a liberal education fortunately, these have been provided for all.

SELF CULTURE

NO one will deny that a large and very important part of mental and physical training is furnished by parents and teachers. Their influence is vast and far-reaching. If it were not so, if the school-master and prossor had no hand in forming mind and aracter, the doors of our schools and academies might as well be shut and nailed up.

As wrapt and hidden in the stone's embrace
The future statue lies yet undefined;
Till the nice chisel clears the form designed,
The trunk, the moving limbs, the speaking face
Develops: so instruction's hand must trace
The intellectual form, which lies enshrined
'Mid nature's rude materials; and the mind
Invest with due proportion, strength and grace.
God, to thy teaching, delegates the art
To form the future man: the care be thine,
No shape unworthy from the marble start,
Reptile or monster; but with just design
Copy the heavenly model, and impart,
As best thou canst, similitude divine.

But what can others do for us compared with what we can do for ourselves? Books are our teachers and the printer's type rules the world.

Very justly it has been said by a recent writer: We all have two educations, one from others, and another which we give ourselves. It is this last education which determines our standing in society, and our actual condition in life, and our fate hereafter. All the professors and teachers in the world would not make you a wise or good man without your own co-operation; and if such you are determined to be, the want of them will not cause you to fail. We are to make the most of ourselves. It should be the duty of education to make men first and noble deeds will follow.

The educated man is the one who wears the crown—the man who can learn from reading and observation and then apply what he knows. Every manufacturer, and every other employer, knows the vast difference between an educated and uneducated workman. Two men come, soliciting work. One is boorish in appearance, ungrammatical in speech, dull in comprehension because his faculties have never been sharpened; he seems to be little less than a machine and with scarcely more comprehension. The other is bright, quick, speaks correctly, gives evidence of self-training and capacity. By his side the other presents a pitiable spectacle, and in the competition is distanced, as a trained sprinter outstrips a man on wooden legs. This is something occurring around us every day and within the commonest observation.

Great Value of Ready Information.

In all education a knowledge of men and things is indispensable. For this reason the cultured classes of Europe, and to some extent of our own country, have considered it essential for the boy or girl who has passed through the schoolroom and mastered the course of study, to seek information from other sources; to take a trip through the outside world and lay in a fund of such knowledge as can be obtained only by observing the daily doings of ordinary life and the people who are the actors in events of constant occurrence. The eye is the prime teacher. Open it and keep it open. Look, examine, ask questions, and do not be ashamed to ask.

Knock on the lids of books, packed with useful information, and say, "I am here to learn what you have to tell me. We are to become well acquainted; I am going to keep company with you; teach me, surprise me, store my mind with knowledge; unfold your secrets; let me into the sanctum; I have come to stay, and mean to traverse your charming pages until they are worn to a beaten path."

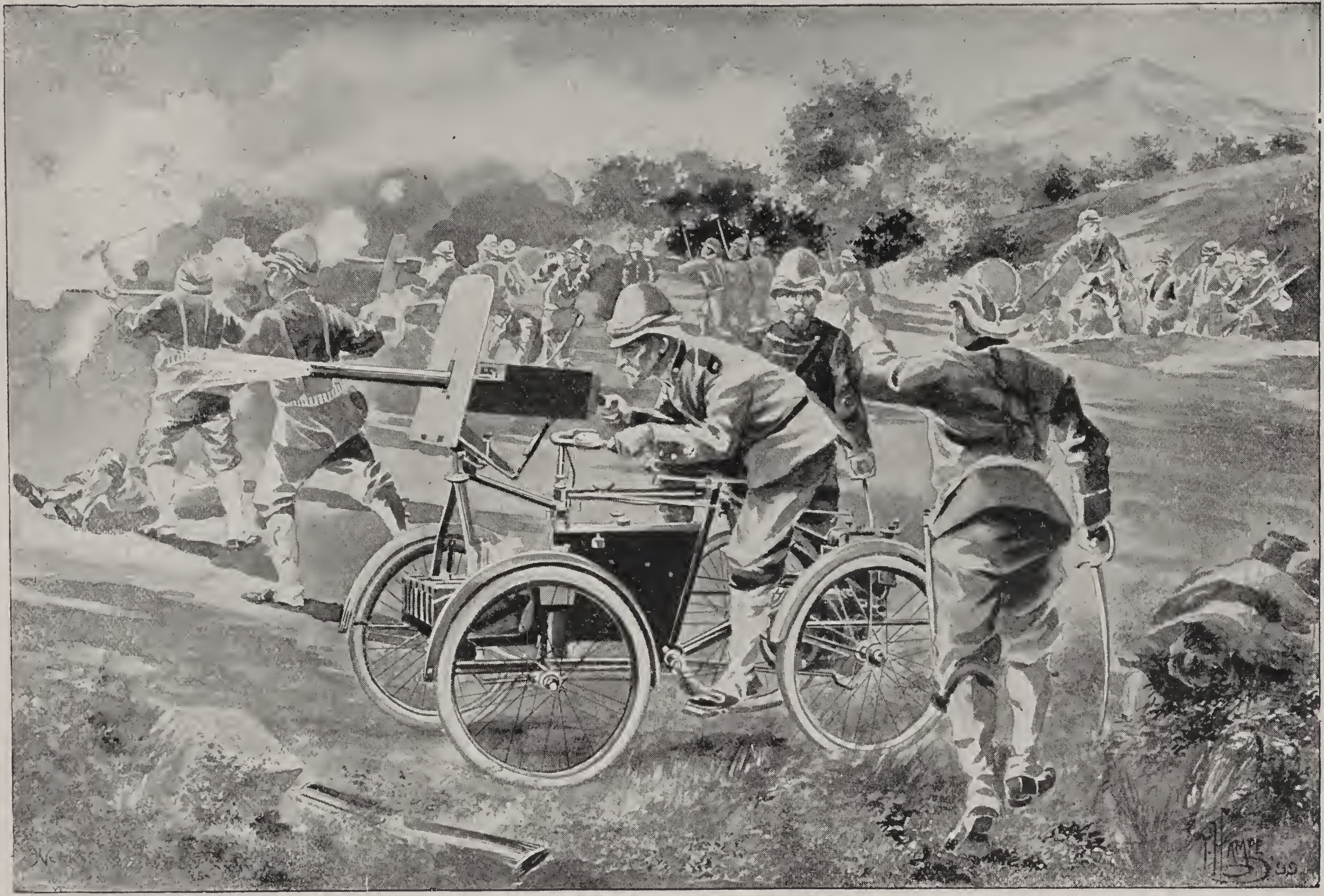
Say this to your books of thought, of knowledge, of all practical information. W say practical, for there is much that you d not need to know, and would not make yo wiser if you did know. Common sense i the most uncommon, but it is the bes What will be useful for everyday life, teaching you how to think, to feel, to act, to succeed, to make the most of yourself, to ste up higher and higher on the ladder of fam and fortune—this is what your book shoul teach.

Gold Must be Refined.

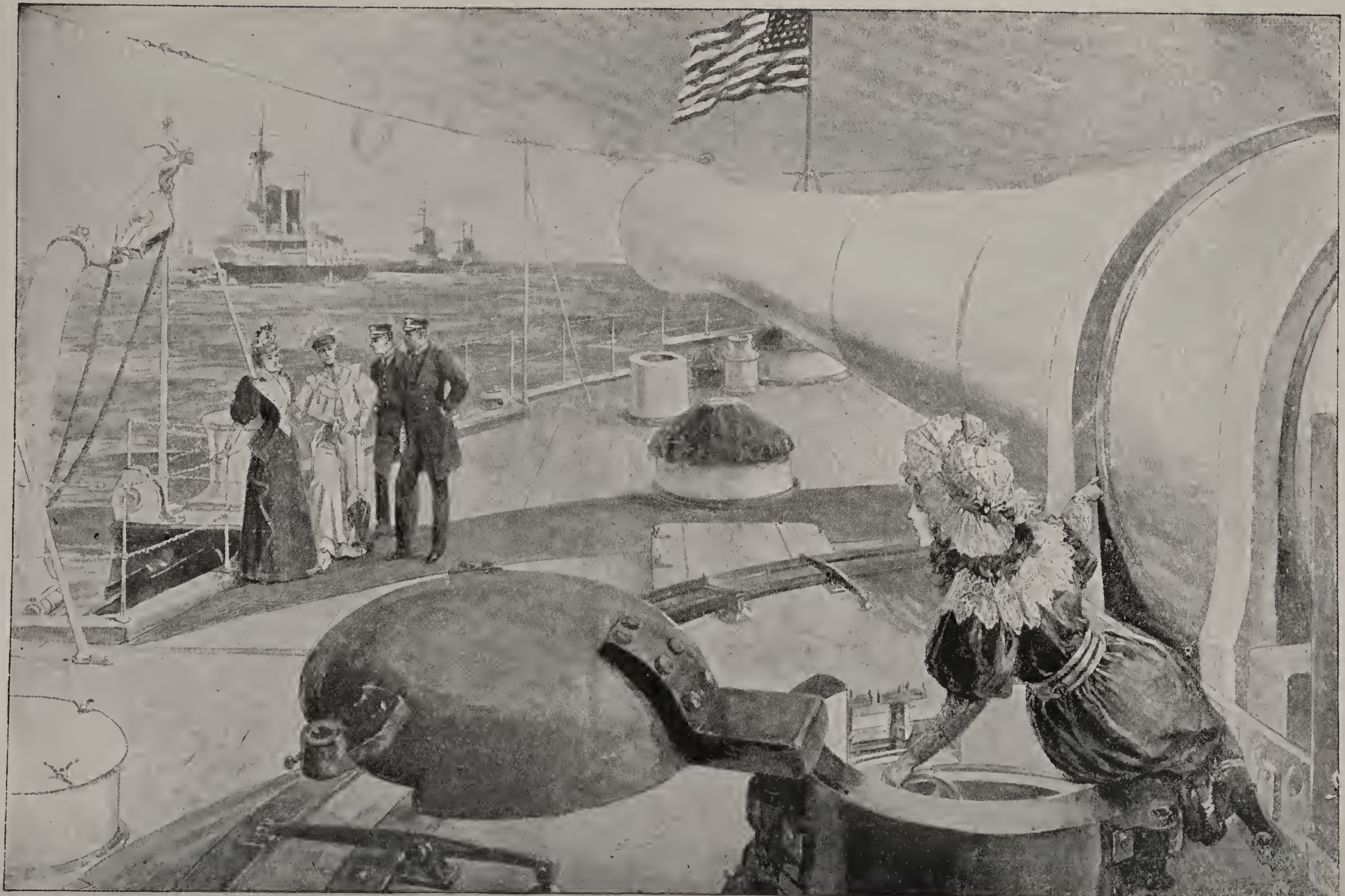
There is sure to come a time when thos who have neglected self-culture in early lif see the great mistake they have made; the regret it when perhaps it is too late. Although they are conscious of their ow defects, their ignorance and sad lack o education, they have not time and opportunity to apply the remedy. You should therefore, make the most of your advantage while you have them.

Very bright minds may remain in eclips for want of cultivation. The diamond is no allowed to continue in its rough state; i must be cut and polished. Gold must b separated from the rude ore; it is of smal account until this is done. Cicero says cultivation to the mind is as necessary a food to the body. Soil uncultivated may produce the most luxuriant weeds, yet only weeds; it must be plowed, hoed, harrowed before it will produce good fruit.

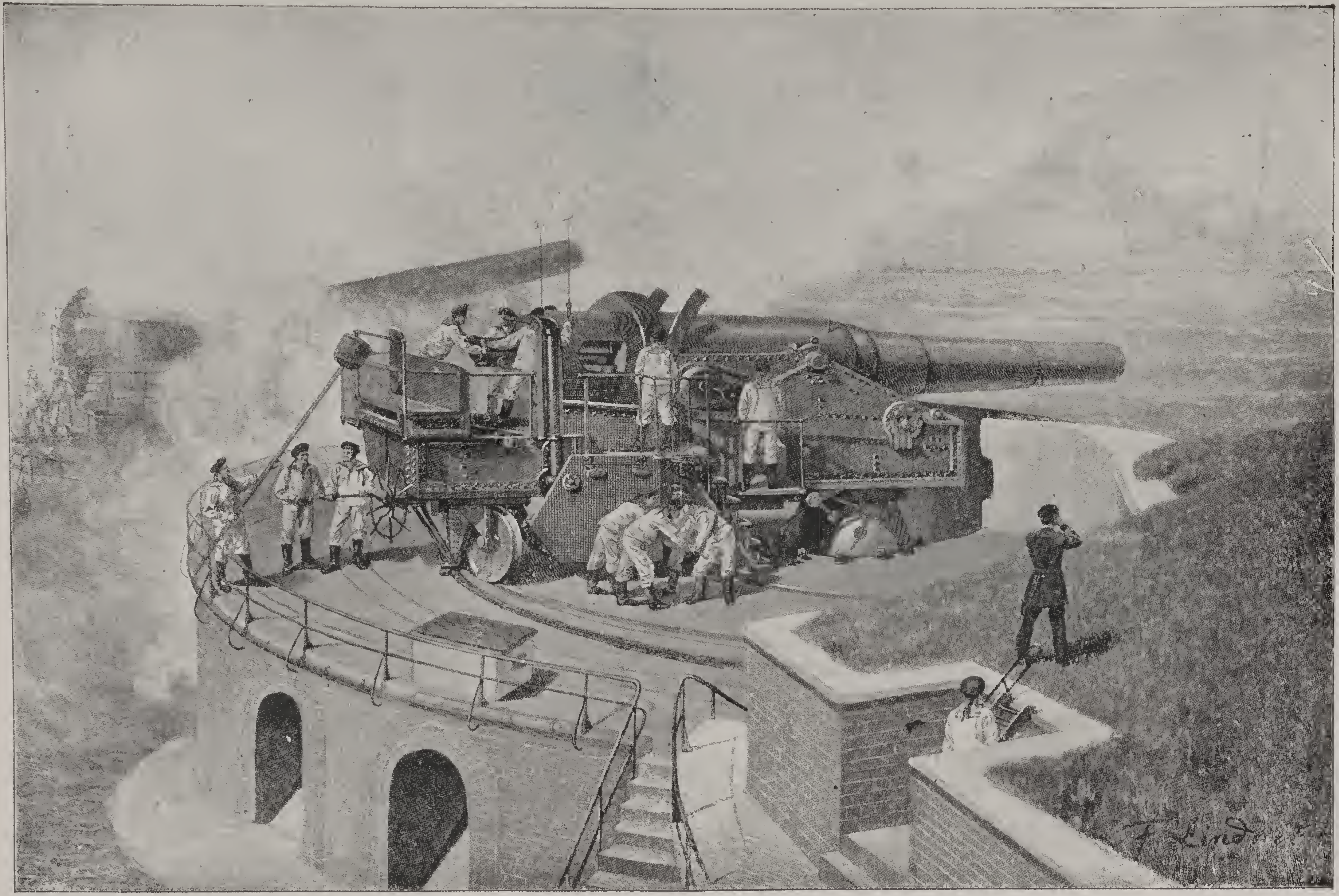
Chesterfield said: I am very sure that any man of common understanding may, by culture, care, attention and labor, make himself whatever he pleases, except a great poet. This is only a part of the testimony that is given by the great minds of all ages, affirming that close application and rigorous discipline are essential to the highest attainments and the most brilliant success.



THE AUTOMOBILE IN WAR—RAPID-FIRE GUNS USED BY THE ENGLISH TROOPS AT THE DEFENCE OF LADYSMITH

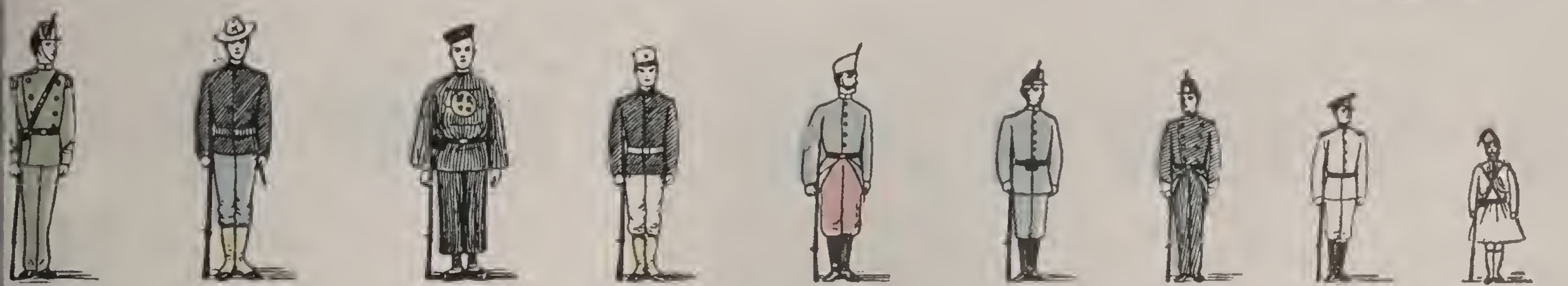


VISITORS ON BOARD A MAN-OF-WAR—A LITTLE CHILD MOVES A GUN WEIGHING 67 TONS



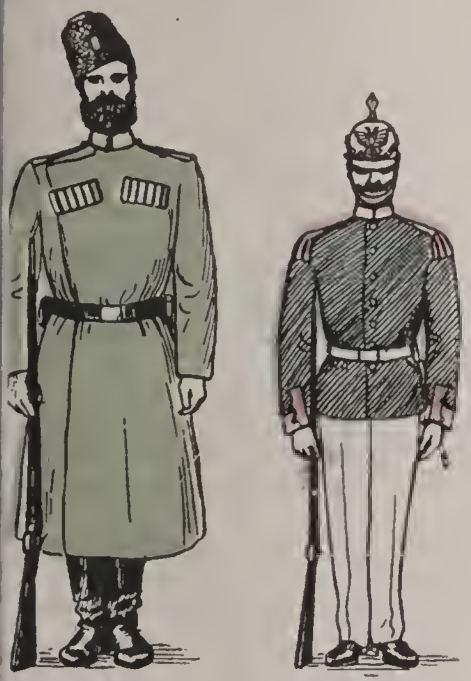
REVOLVING GUNS USED FOR COAST DEFENSE

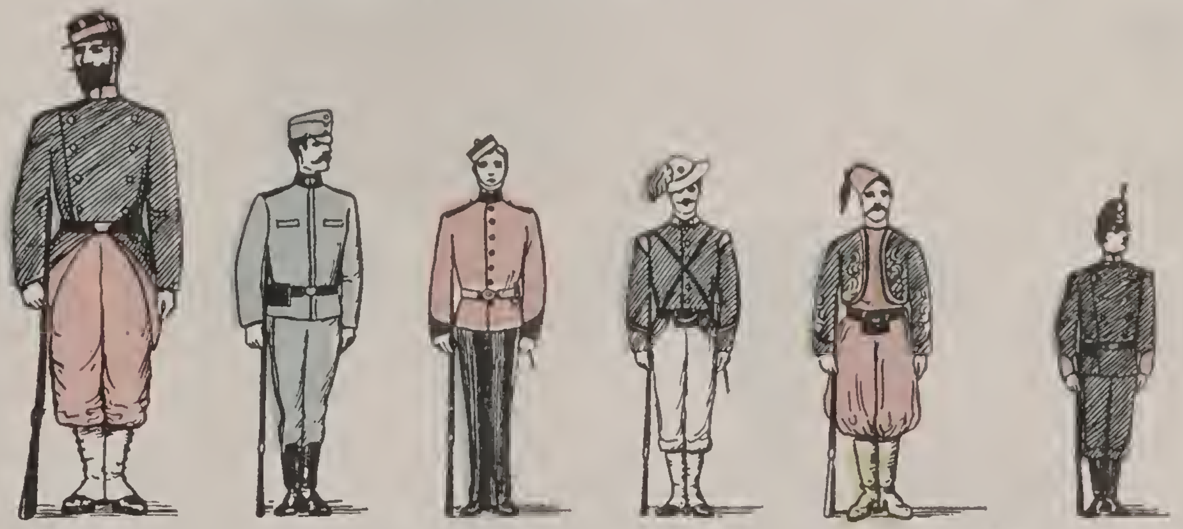
THE FIGHTING STRENGTH OF THE PRINCIPAL NATIONS OF THE WORLD.



THERLANDS	CE 116,748	R-248,748
U.S.A.	65,000-100,000	6,000,000
CHINA.	100,000	OVER4.000,000
JAPAN	87,874	402,274
SPAIN	86,110	1,094,110
SERVIA	66,050	256,050
BELGIUM	57,722	182,722
BULGARIA	35,400	233,400
GREECE	18,700	224,800

ARRANGED AS TO RELATIVE SIZE OF STANDING ARMIES. GIVING WAR FOOTING BELOW.





RUSSIA	ACE 883,146	AR 5,473,902
GERMANY	691,870	5,620,212
FRANCE	579,870	4,902,506
AUSTRIA	265,608	1,763,619
GREAT BRITAIN	254,491	612,500
ITALY	211,906	2,035,990
TURKEY	211,500	1,324,200
SWITZERLAND	139,710	496,710

PRINCIPAL NAVIES OF THE WORLD

ARRANGED IN ORDER OF FIGHTING STRENGTH

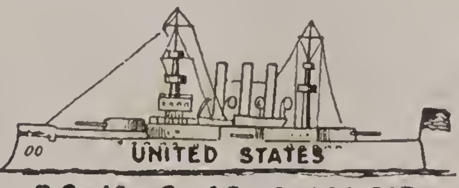
GIVING ALSO THE NO. OF WARSHIPS.

B.S.=BATTLESHIP
C.=CRUISERS
O.=ALL OTHERS

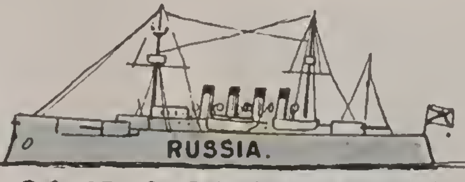
B.S.=70, C.=214, O=402, TOTAL 686.

B.S.=32, C=92 O=428, TOTAL 502

B.S.=17, C.=56, O=201 = 274



B.S.=18, C.=49, O.=146=213



B.S.=23, C.=55, O.=275, =353

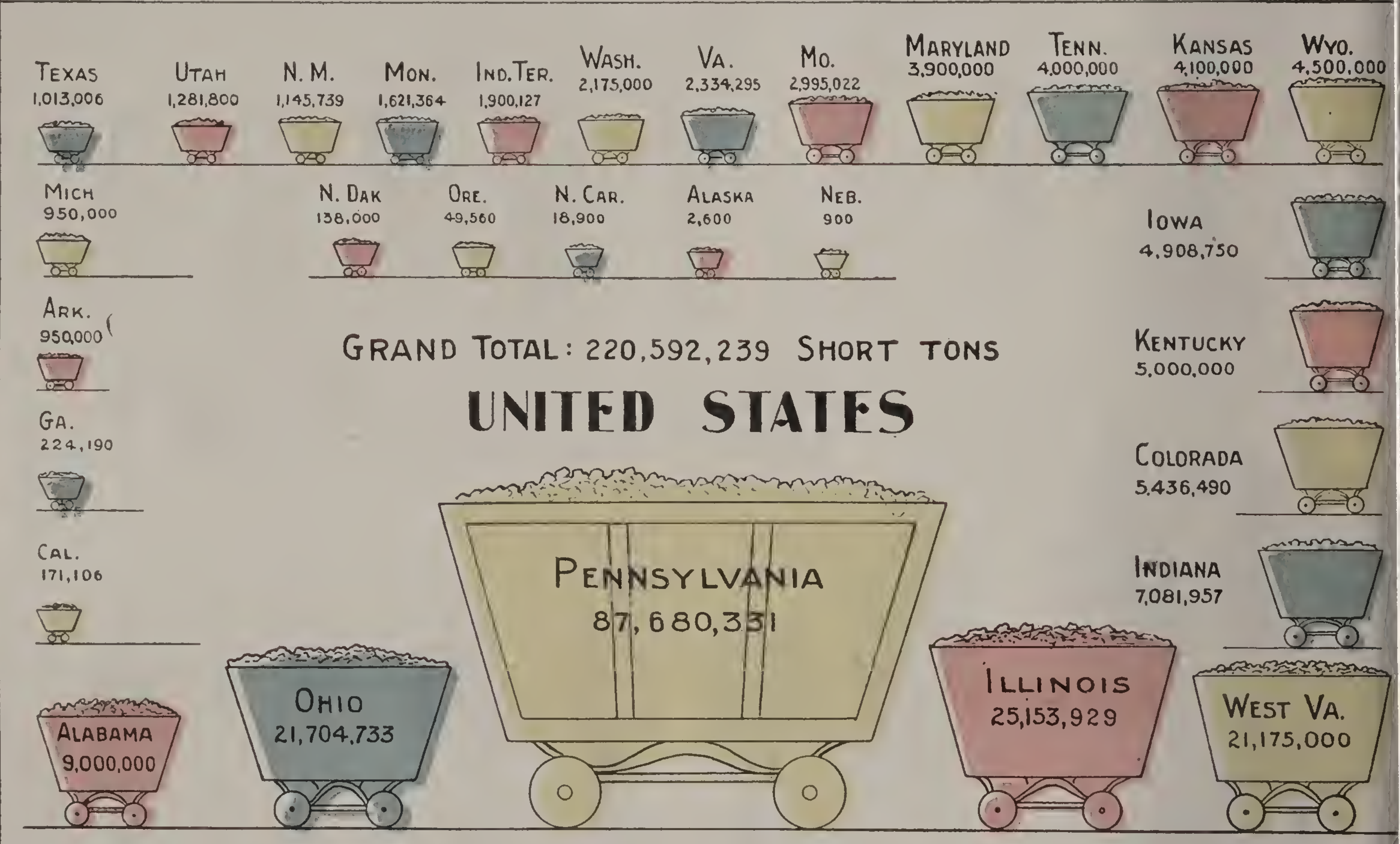
275= SHIPS

144 SHIPS

120 SHIPS

230 SHIPS

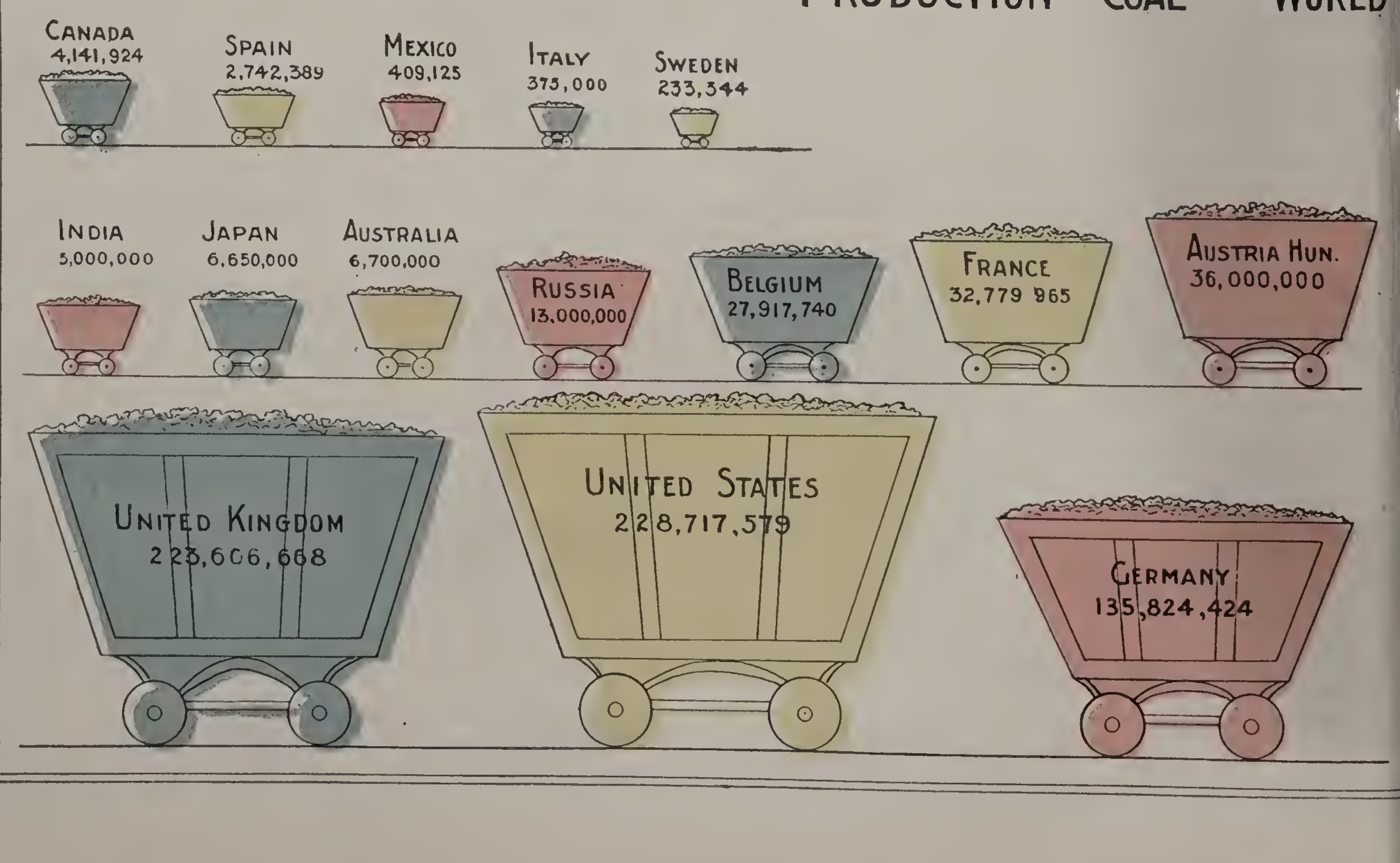
COAL PRODUCTION FOR ONE YEAR IN THE UNITED STATES AND OTHER COAL PRODUCING COUNTRIES



GRAND TOTAL: 220,592,239 SHORT TONS

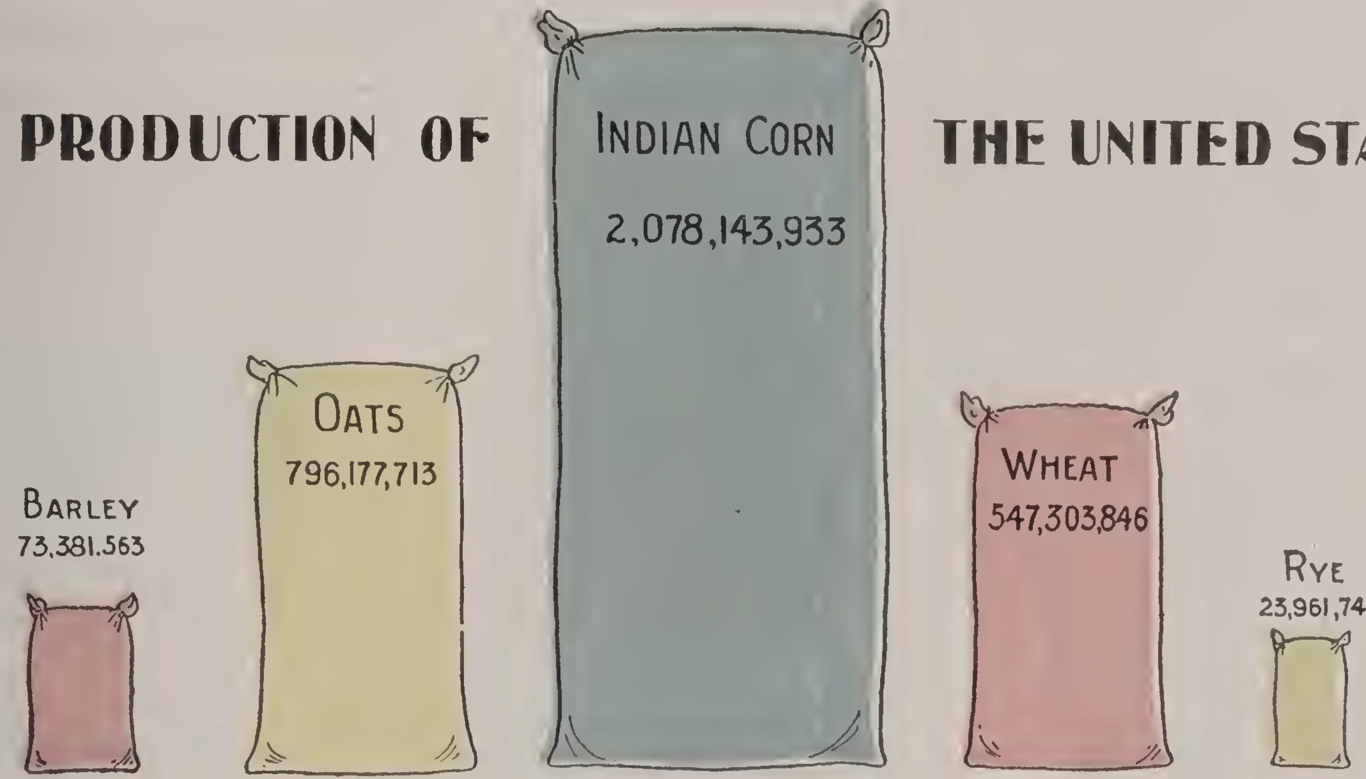
UNITED STATES

PRODUCTION OF COAL IN THE WORLD

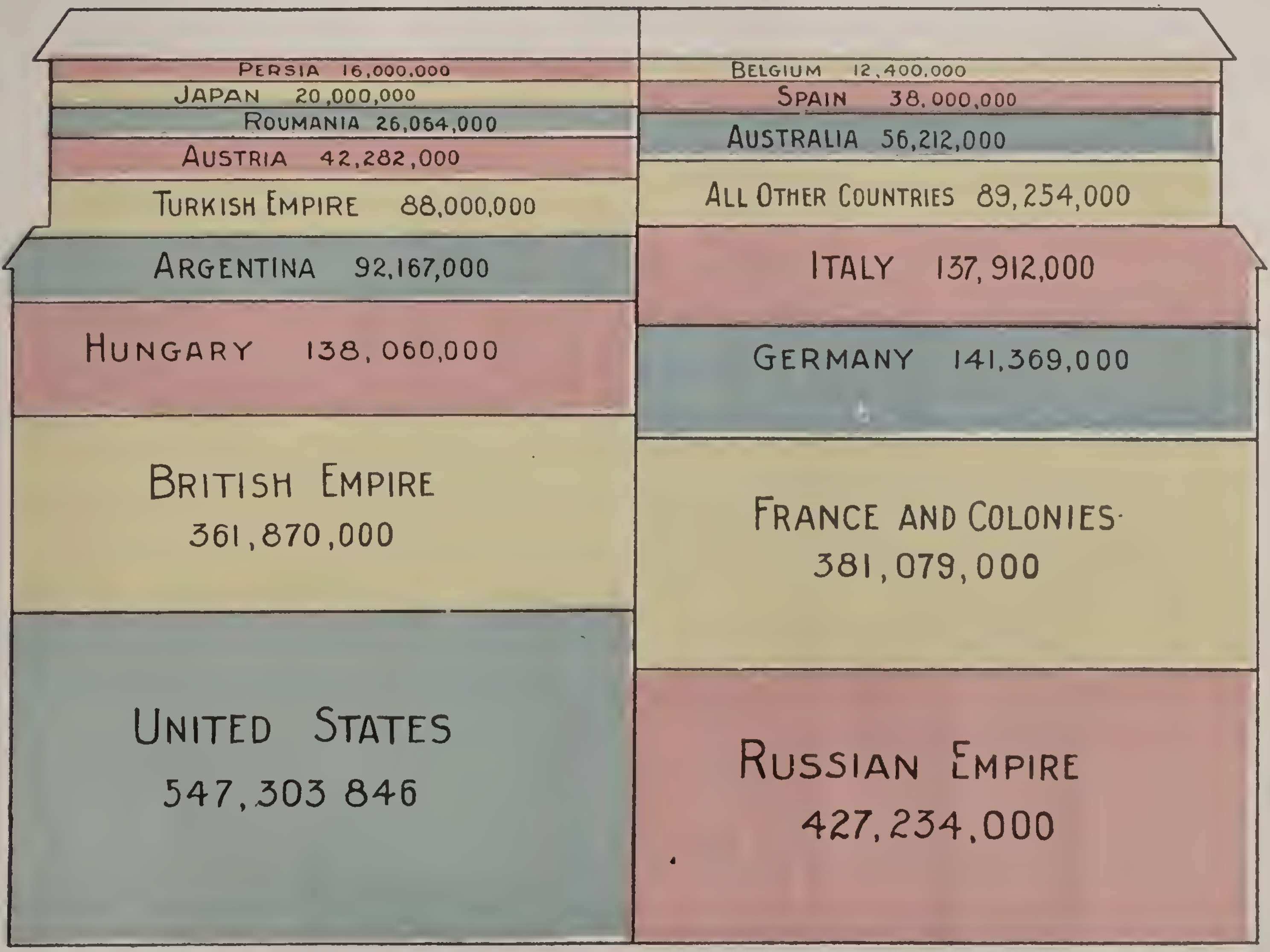


CEREAL PRODUCTION IN BUSHELS

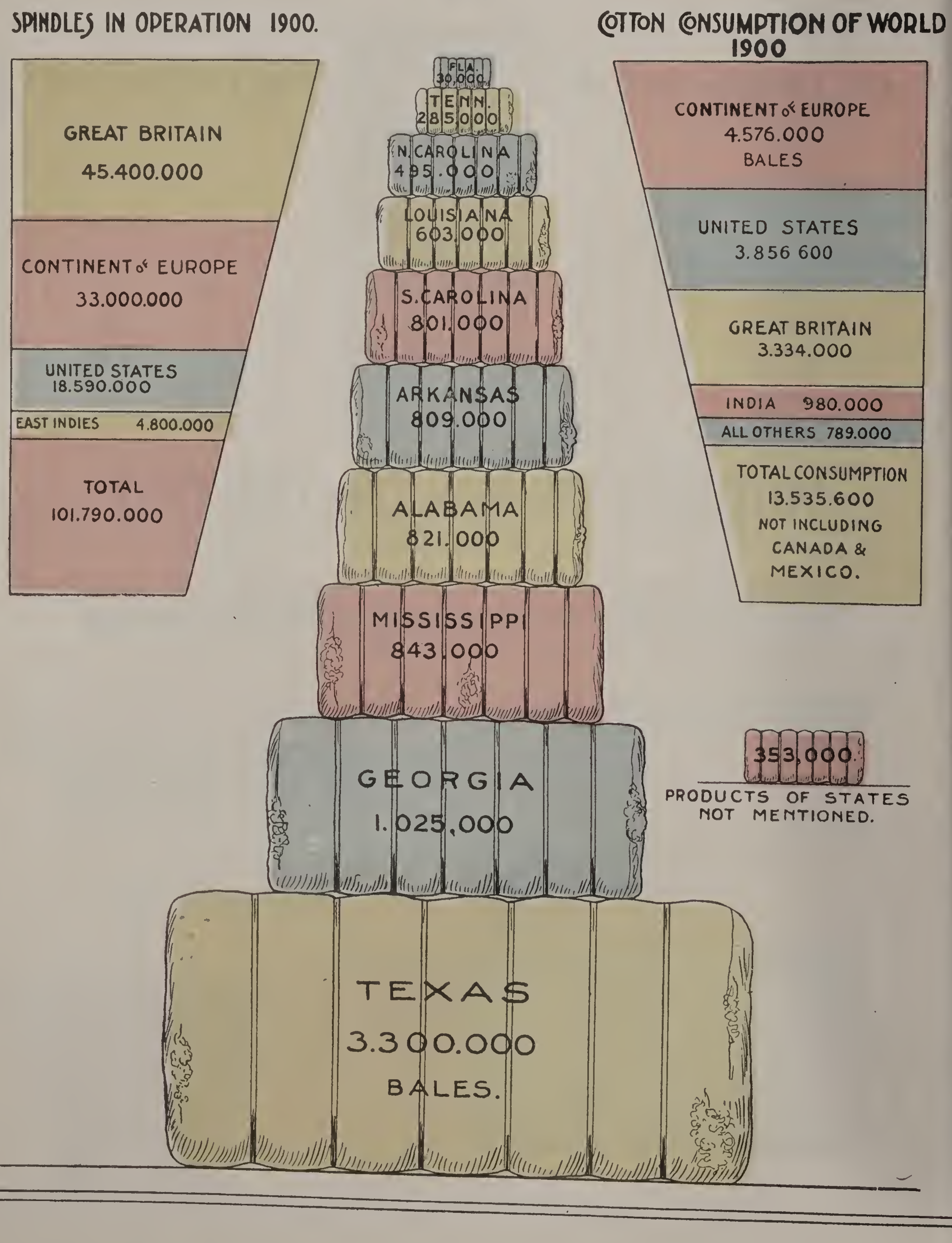
GRAIN PRODUCTION OF THE UNITED STATES



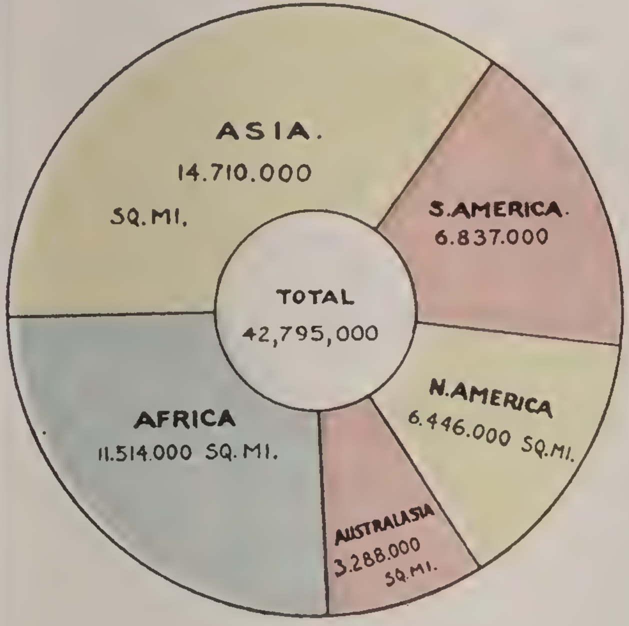
WORLDS' PRODUCTION OF WHEAT

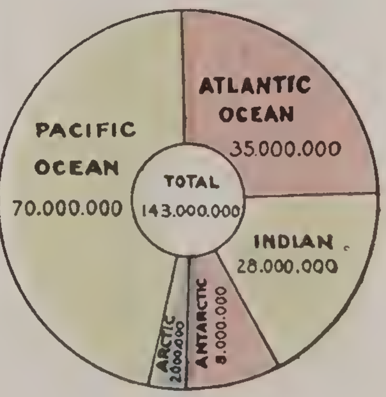


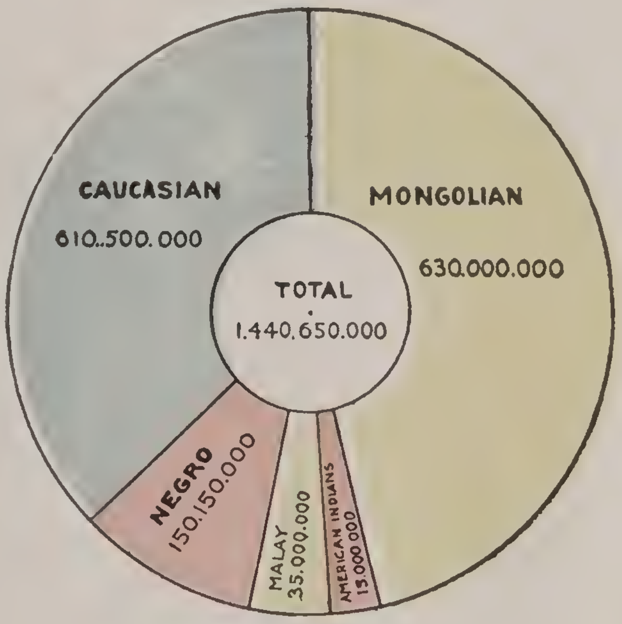
COTTON CROP OF THE UNITED STATES
SPINDLES IN OPERATION AND COTTON CONSUMPTION OF THE WORLD

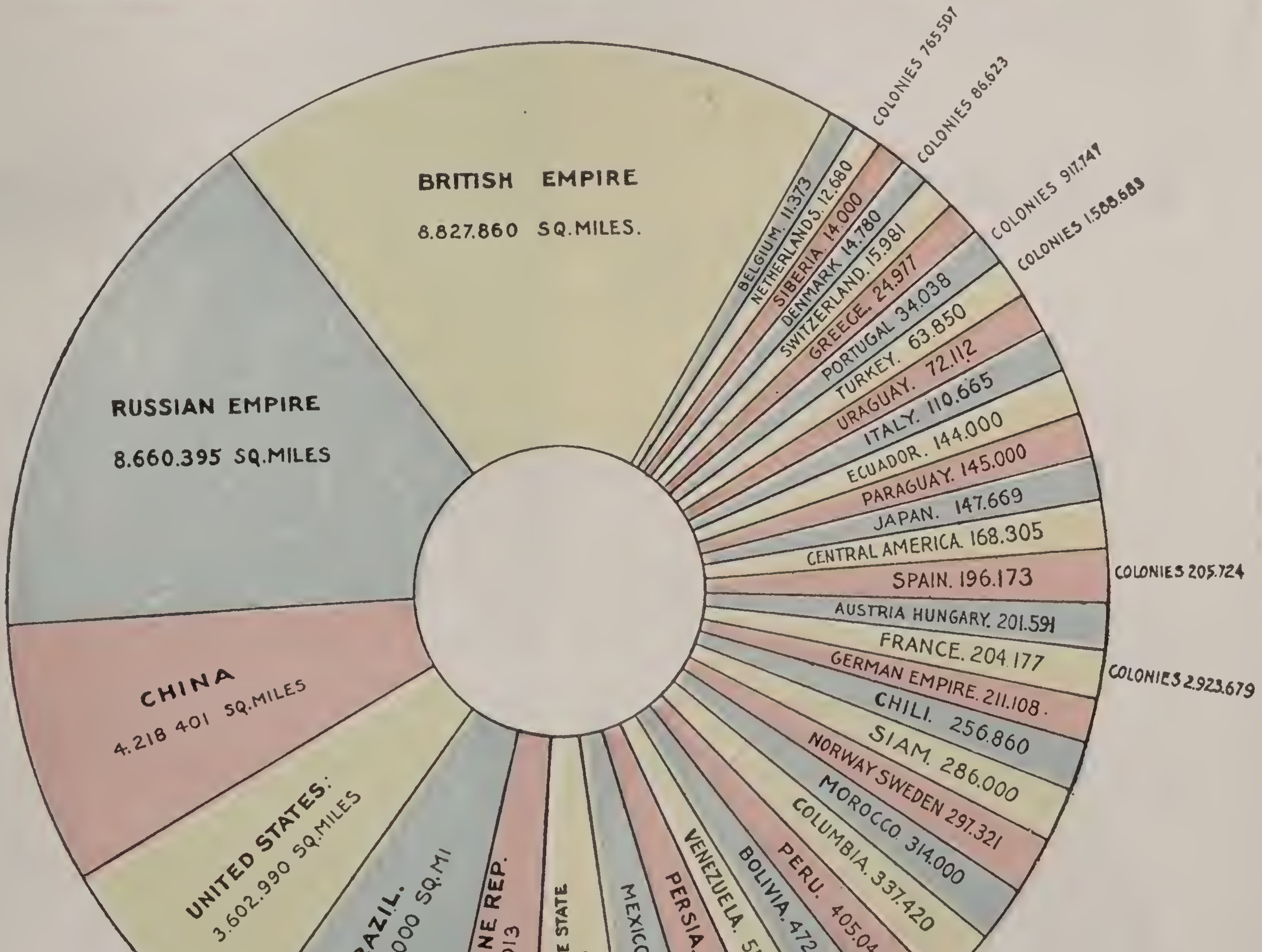


AREA OF THE WORLD IN SQ. MILES
AND
POPULATION OF THE EARTH ACCORDING TO RACE

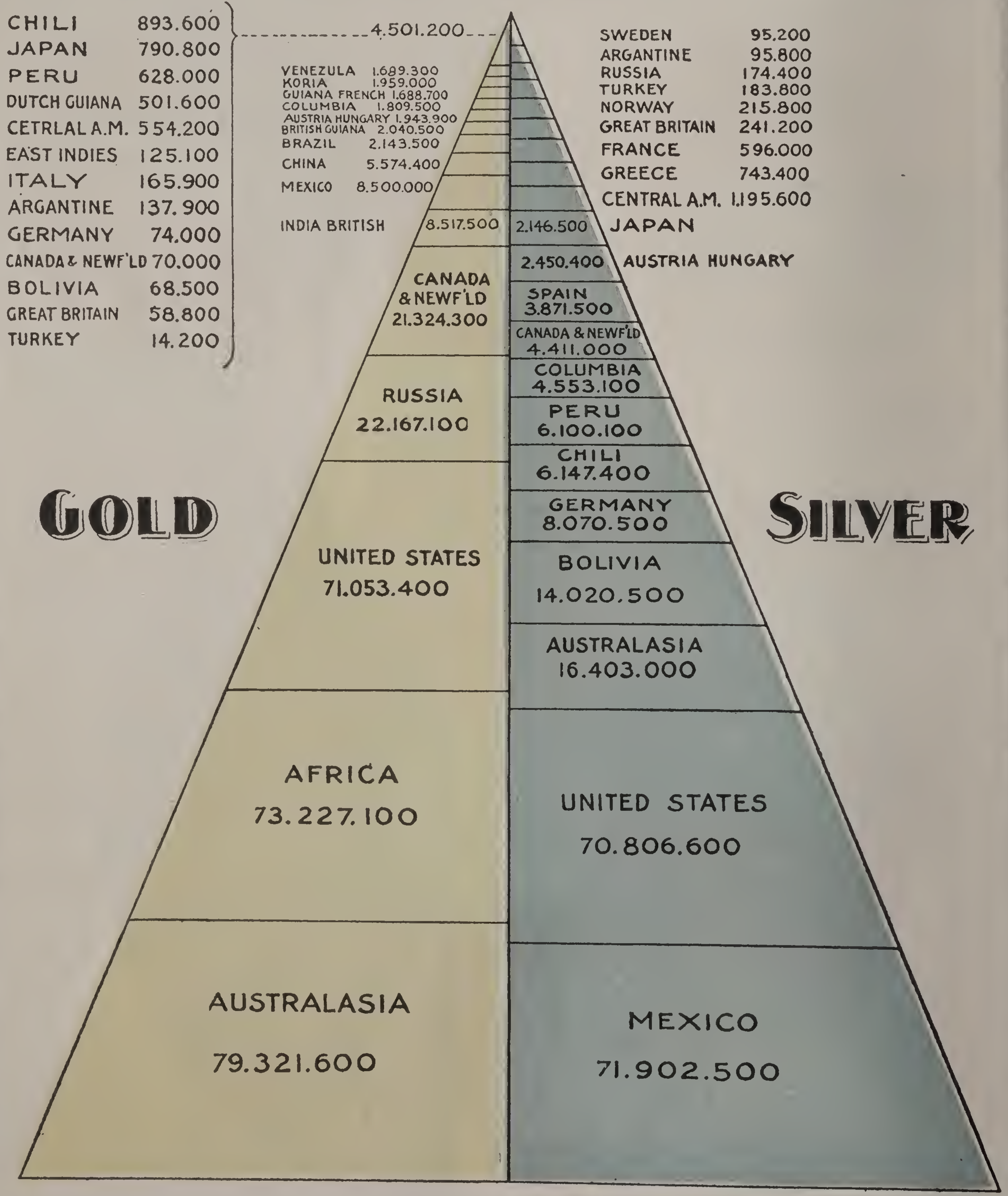






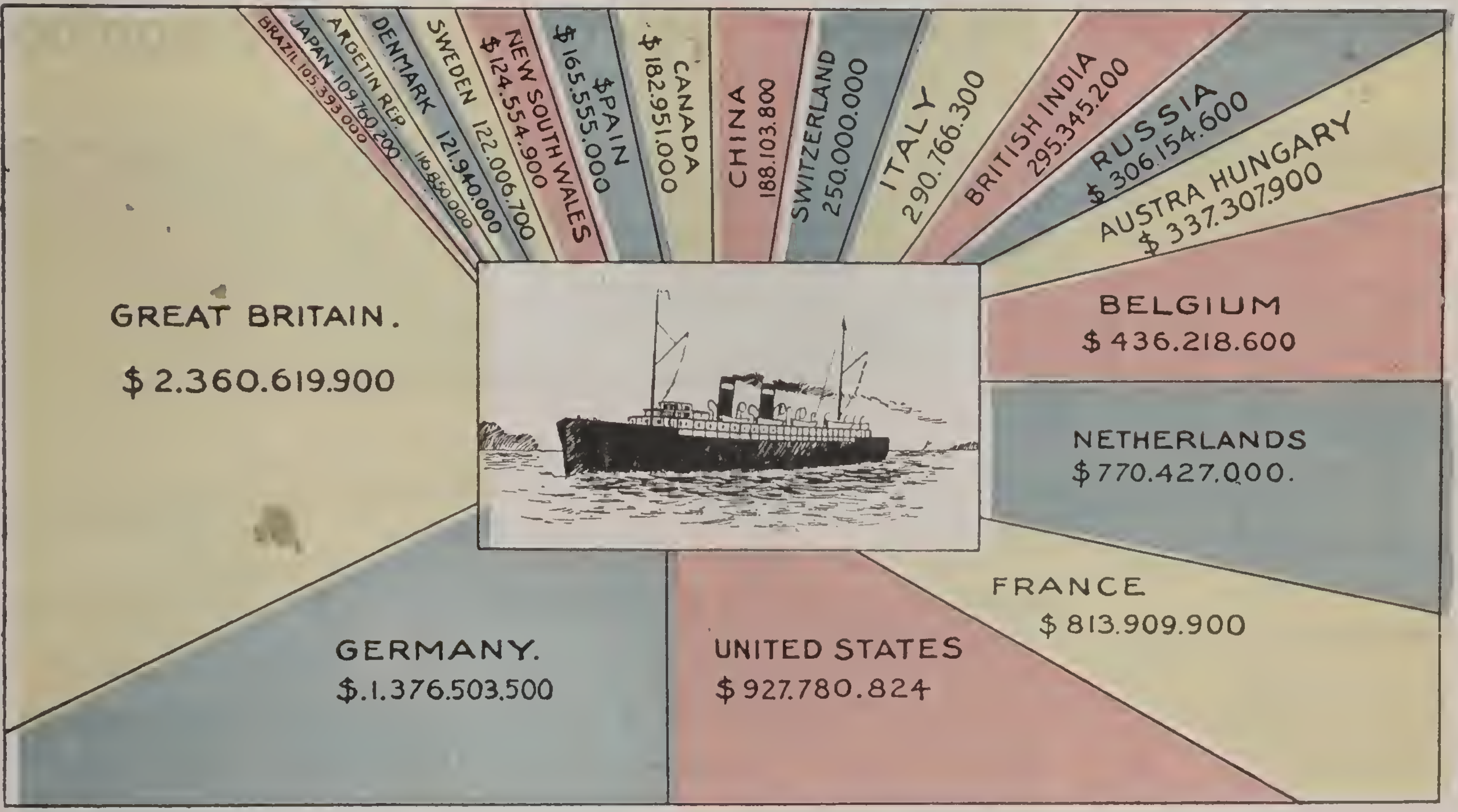


WORLDS PRODUCTION OF GOLD AND SILVER ACCORDING TO COINING VALUE

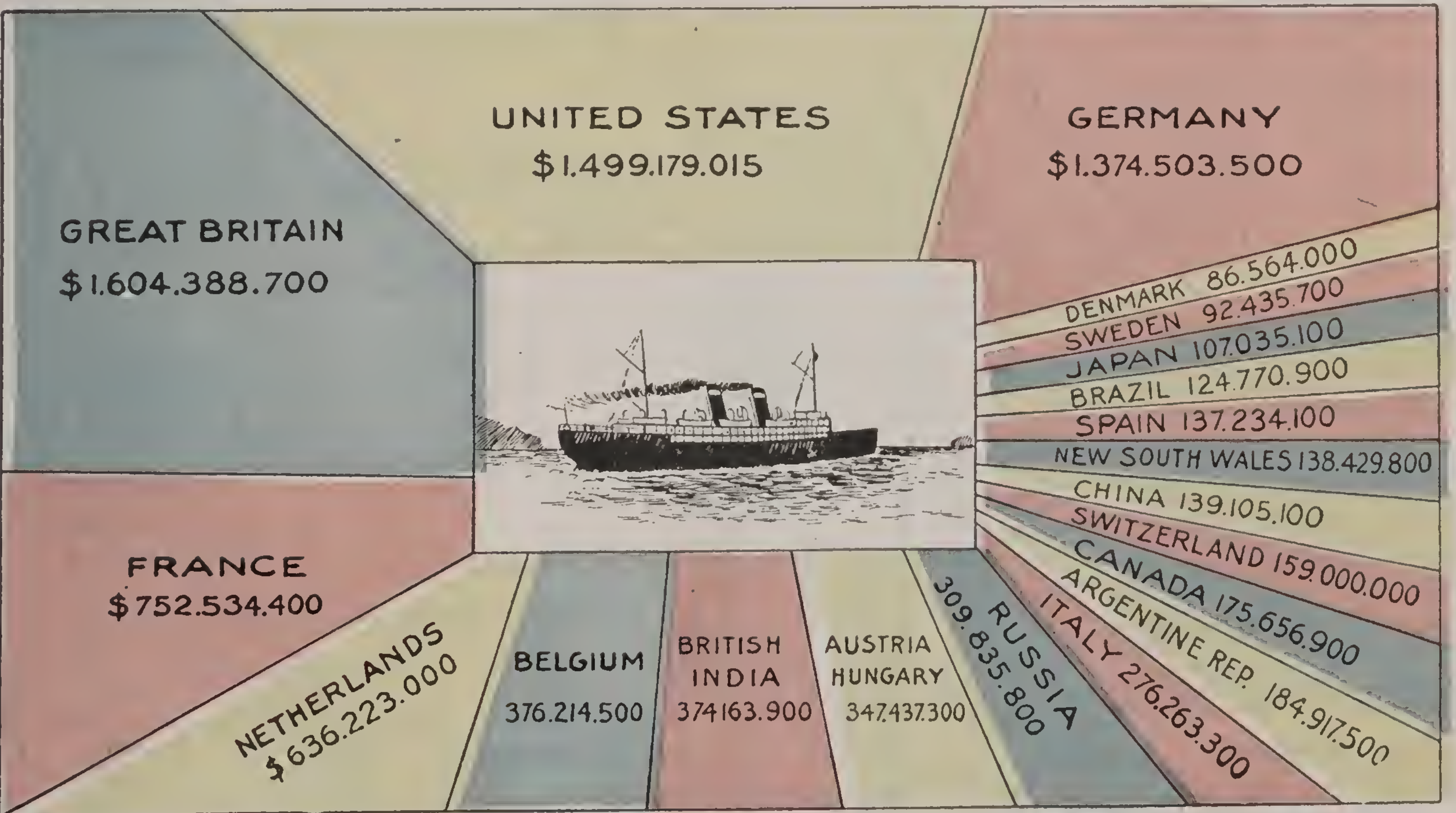


IMPORTS AND EXPORTS OF THE PRINCIPAL COUNTRIES OF THE WORLD

IMPORTS



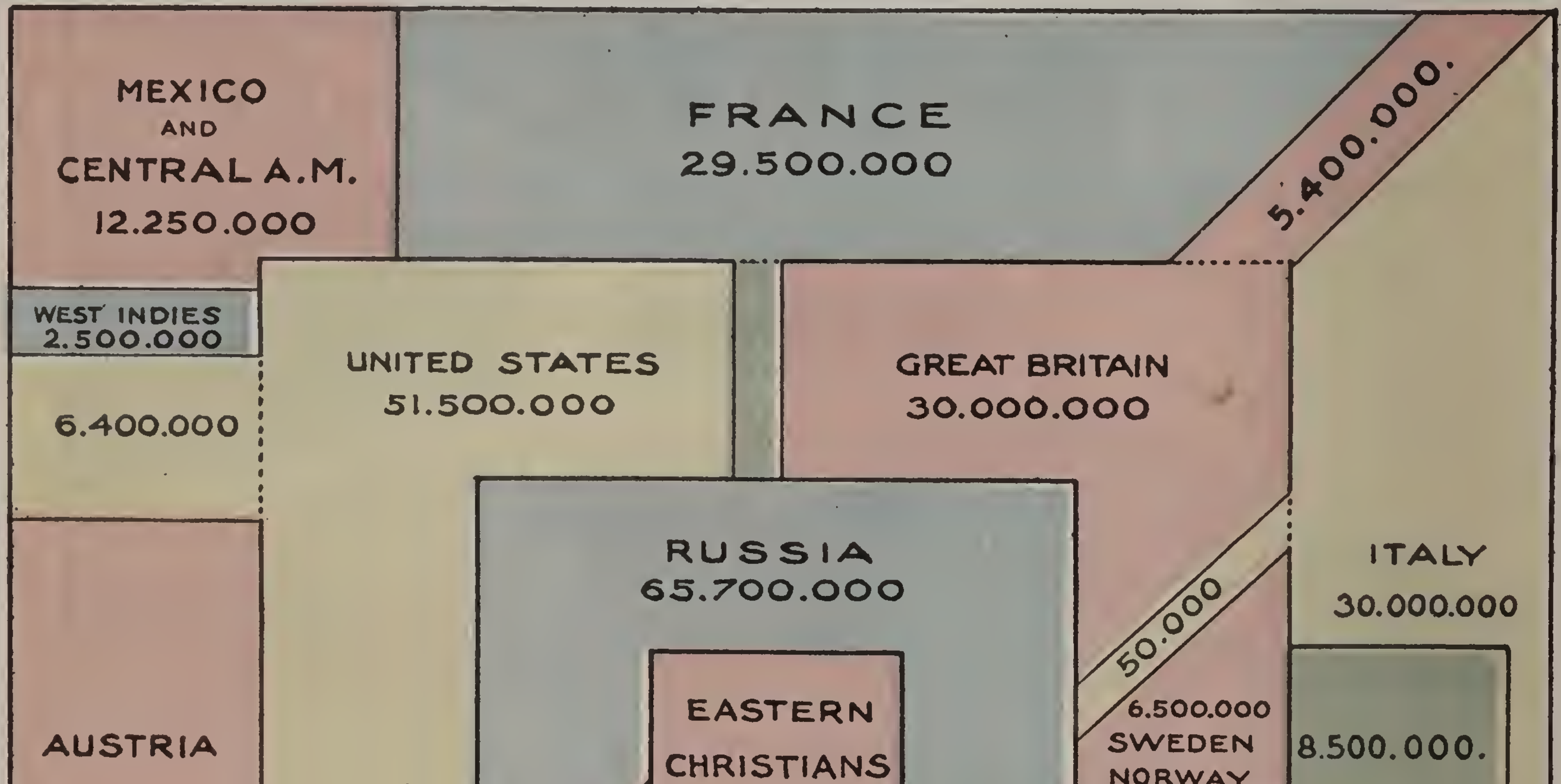
EXPORTS



PRINCIPAL RELIGIONS
DISTRIBUTION OF CHRISTIANS OF THE WORLD

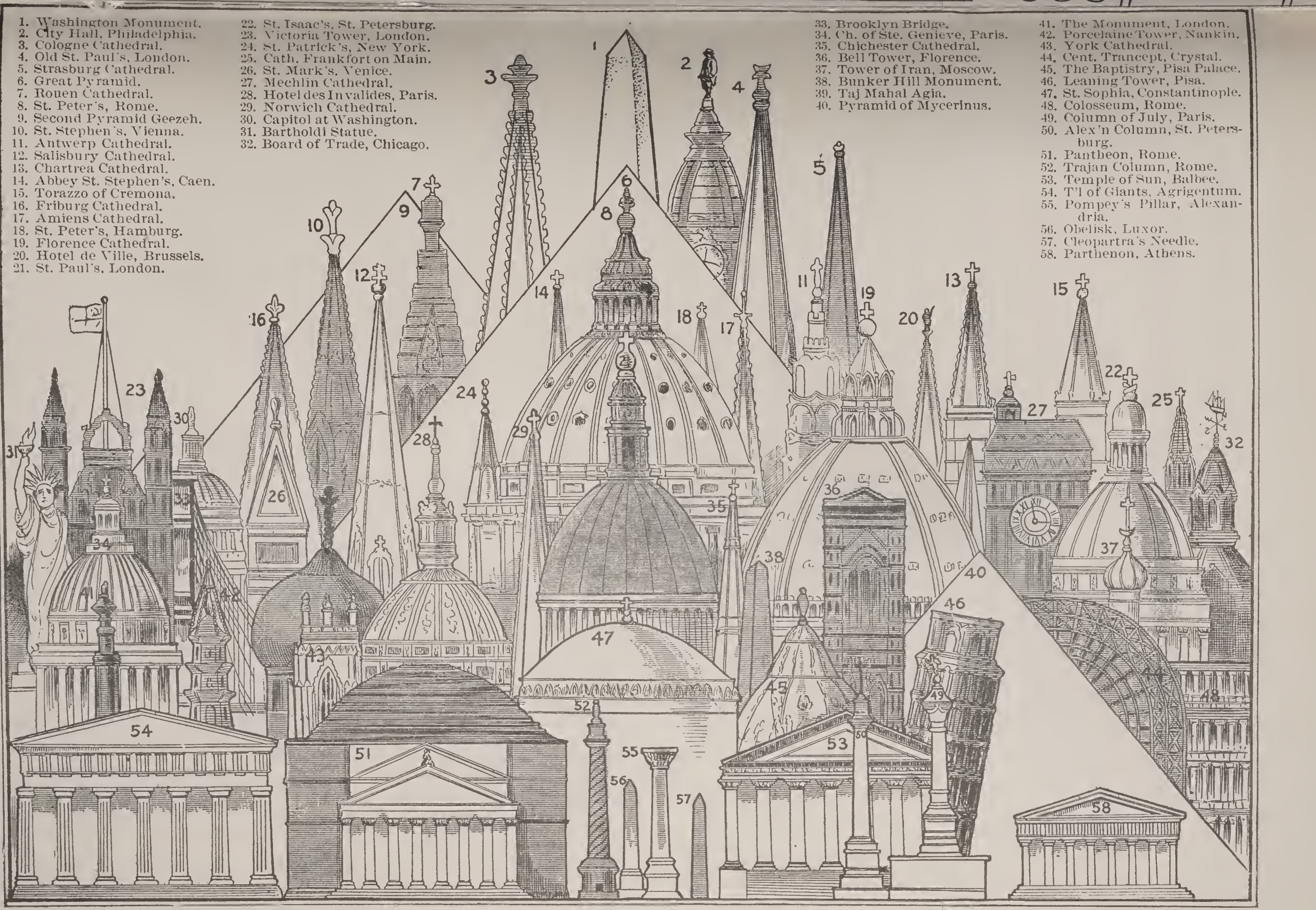
ROMAN CATHOLICS	200.000.000	JEWS	10.000.000
PROTESTANTS	150.000.000	MOHAMMEDANS	170.000.000
GREEK CHRISTIANS	90.000.000	HEATHENS	170.000 000

PAGAN RELIGIONS 700.000.000



a-	AFRICA	ROM. CATH. PROT.	1.200.000 900.000
b-	AUSTRALIA & POLYNESIA	ROM. CATH. PROT.	500.000 1.200.000
c-	ARCH., ARABIA & PERSIA	ROM. CATH. PROT.	1.000.000 95.000
d-	INDIA & CEYLON	ROM. CATH. PROT.	1.700.000 500.000
e-	SWITZERLAND	ROM. CATH. PROT.	1.195.000 1.900.000
f-	CHINA & JAPAN	ROM. CATH.	850.000
g.	LUXEMBURG	ROM. CATH.	225.000

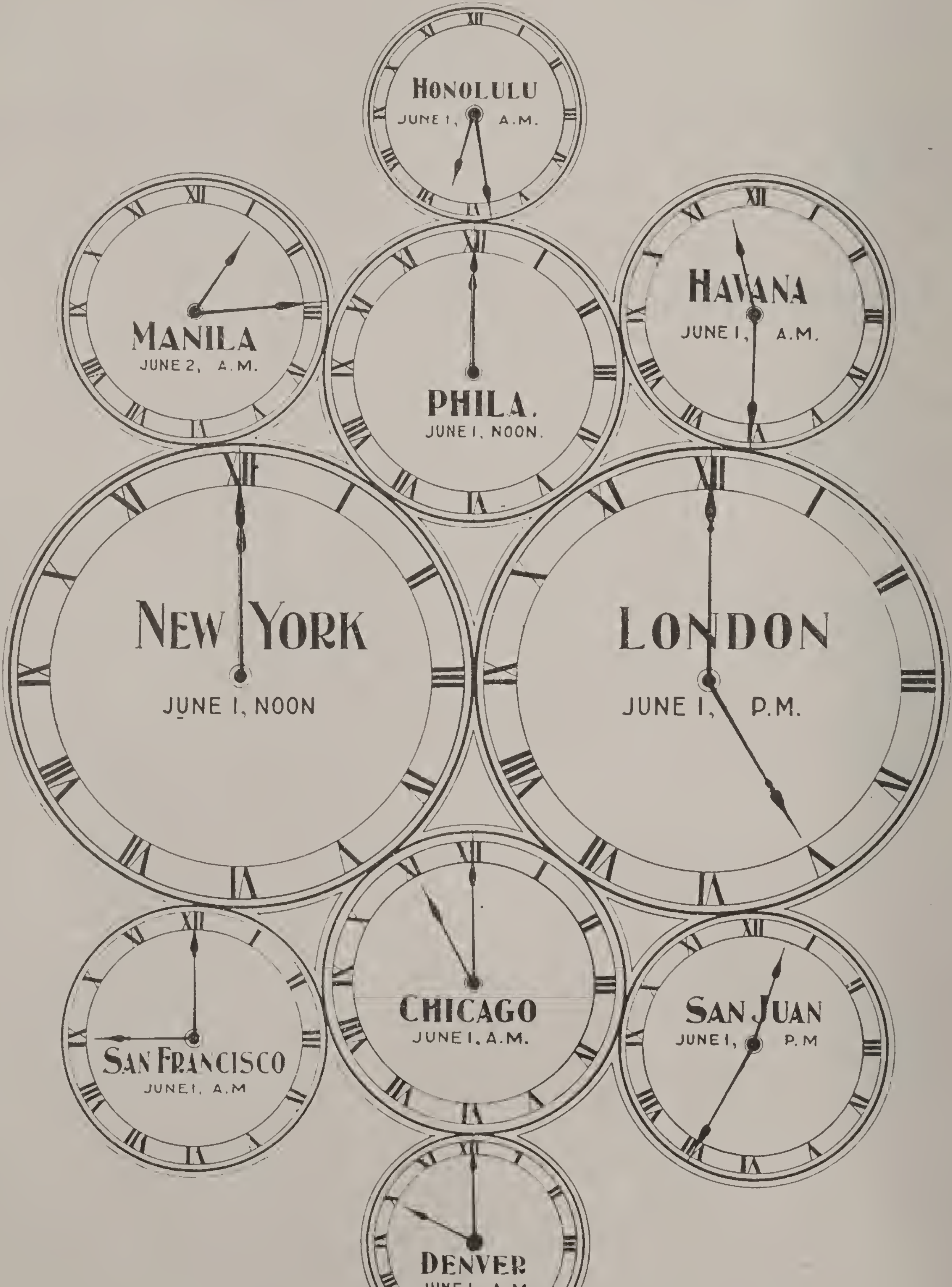
OUTER SQUARE—ROMAN CATHOLICS. SECOND SQUARE—PROTESTANTS.
THIRD SQUARE—GREEK CHRISTIANS.



1. Washington Monument.
2. City Hall, Philadelphia.
3. Cologne Cathedral.
4. Old St. Paul's, London.
5. Strasburg Cathedral.
6. Great Pyramid.
7. Rouen Cathedral.
8. St. Peter's, Rome.
9. Second Pyramid Geezeh.
10. St. Stephen's, Vienna.
11. Antwerp Cathedral.
12. Salisbury Cathedral.
13. Chartrea Cathedral.
14. Abbey St. Stephen's, Caen.
15. Torazzo of Cremona.
16. Friburg Cathedral.
17. Amiens Cathedral.
18. St. Peter's, Hamburg.
19. Florence Cathedral.
20. Hotel de Ville, Brussels.
21. St. Paul's, London.
22. St. Isaac's, St. Petersburg.
23. Victoria Tower, London.
24. St. Patrick's, New York.
25. Cath. Frankfort on Main.
26. St. Mark's, Venice.
27. Mechlin Cathedral.
28. Hotel des Invalides, Paris.
29. Norwich Cathedral.
30. Capitol at Washington.
31. Bartholdi Statue.
32. Board of Trade, Chicago.
33. Brooklyn Bridge.
34. Ch. of Ste. Genieve, Paris.
35. Chichester Cathedral.
36. Bell Tower, Florence.
37. Tower of Iran, Moscow.
38. Bunker Hill Monument.
39. Taj Mahal Agia.
40. Pyramid of Mycerinus.
41. The Monument, London.
42. Porcelaine Tower, Nankin.
43. York Cathedral.
44. Cent. Trancept, Crystal.
45. The Baptistry, Pisa Palace.
46. Leaning Tower, Pisa.
47. St. Sophia, Constantinople.
48. Colosseum, Rome.
49. Column of July, Paris.
50. Alex'n Column, St. Petersburg.
51. Pantheon, Rome.
52. Trajan Column, Rome.
53. Temple of Sun, Balbee.
54. T'l of Giants, Agrigentum.
55. Pompey's Pillar, Alexandria.
56. Obelisk, Luxor.
57. Cleopartra's Needle.
58. Parthenon, Athens.

THE HIGHEST STRUCTURES IN THE WORLD.

DIFFERENCE IN TIME BETWEEN NEW YORK AND OTHER PARTS OF THE WORLD



LIQUID AIR.

THE COLDEST SUBSTANCE KNOWN TO MAN. THE MOST MARVELOUS DISCOVERY IN THE REALM OF SCIENCE.

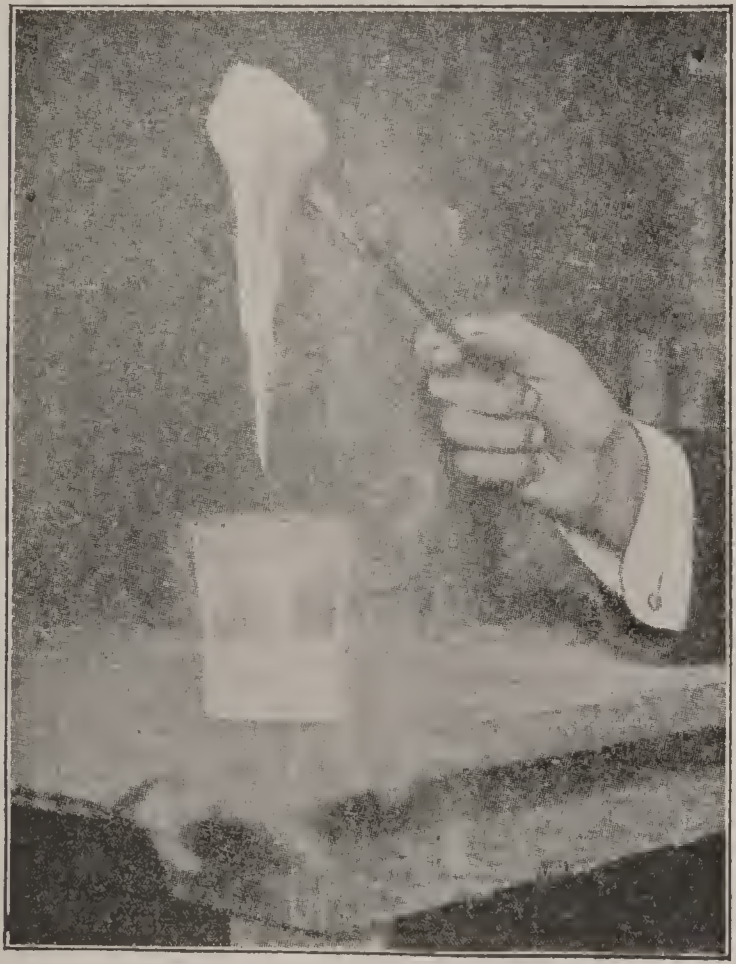
ONE of the most interesting discoveries in the realm of science in late years has been that of liquid air. It was long ago observed that when a gas was compressed so as greatly to reduce its volume, it became hot. This was called the heat of compression, and, strangely enough, was thought to be generated by the act of compression. It is now understood, however, that the rise in temperature is not caused by an increase in heat, but rather by the concentration of the manifest heat of a large volume into a small space. Experiments that proved this also suggested that the discovery could be turned to profit by cooling the heated gas down while under pressure, and then allowing it again to expand to its original volume, which would make it fall greatly in temperature. It was soon learned that gas could be compressed and then cooled and allowed to expand until its temperature dropped 200 degrees.

For some time it had been held by scientists that air was a permanent gas, and could not be changed in its form, but gradually with experiments the idea arose that if air could be brought to a sufficiently low temperature it could be liquefied. All means known were used without success until, in 1877, *Raoul Pictet* submitted oxygen gas to an enormous pressure combined with intense cold. The result was a few drops of clear, bluish liquid that bubbled violently for a few moments, and then evaporated into the air again. In 1892, a Polander named Olzewski succeeded in performing a similar experiment with nitrogen, the other constituent of air. And about the same time Professor Dewar, of England, not only performed both of these experiments, but also succeeded in producing a small quantity of air in a mushy form—in fact, air-ice.

The Cost

of this first ounce of liquid air was more than $3,000. While being a very interesting discovery for laboratory use, such a production and at such an expense was out of the question for commercial purposes. So it remained for Charles E. Tripler, of New York City, to invent a method whereby this wonderful agent can be brought forth with ease and at the cost of about 20 cents a gallon. He saw at once, upon the discovery that air could be liquefied, that it might be a great power generator, and accordingly commenced experiments to simplify the method for procuring it. He investigated the various means by which refrigeration was developed, such as the immense ammonia plants used in breweries and the like. The principle of cooling by expansion, he learned, was the basis to work upon, and the result of his studies was the following system:

At present a fifty-horse power plant operating an air compressor, and a barrel-like arrangement about fifteen feet high, full of small pipes and valves, and protected by wrappings so as to keep out the heat, are the machines by means of which this new discovery is brought forth. Tripler uses compressed air to cool the other air that he is liquefying. Under the very principle that expanding air grows cooler, if he could so arrange his apparatus that air which was rapidly growing cooler could pass about pipes containing his working material, he would have his problem solved. And so it is.



ALCOHOL FROZEN IN A GLASS OF LIQUID AIR.

Air under a pressure of 2,500 pounds to the square inch, and cooled to about 50 degrees Fahrenheit by being passed in pipes through a bath of running water while thus compressed, is carried through coils of pipe to the large felt-and-canvas-covered tube or receiver spoken of. Two sets of pipes lead from the compressor to the receiver: one contains the air to be liquefied, the other the air that does the work of liquefying, but both are under the same heavy pressure. By turning a tap in the receiver, the air that does the work rushes forth and up the sides and around the pipes in the chimney-like space of the receiver. This reduces the pressure, and since air in expanding takes up heat wherever it can be found, the air confined in the pipes is cooled. As the released air now grows warmer and climbs to the top of the receiver, it gradually returns to the compressor. Here it is again brought under pressure and cooled again, only to be released once more in the receiver to lick up more warmth from the air in the pipes. Since the temperature of the air under treatment is going down in jumps of 100 degrees every time it is treated to this chilling process, it takes but about fifteen minutes till a tap at the bottom may be turned, and drops of liquid air at the temperature of 312 degrees below zero drip out from the pipes in the receiver. These at once evaporate in great billowy clouds of vapor.

But it is not intended that such an operation shall be devoid of results, so devices have been invented for holding the air after its production. One of these receptacles is the

Dewar Bulb.

It consists of two vessels of glass, one within the other, having a high vacuum between the walls, and joined in a common neck at the top. The vacuum prevents the passage of heat, so that the evaporation of the liquid in the inner tube is reduced to a minimum. The neck of the bulb is left open, for liquid air is of such an expanding nature that it would otherwise explode. The cold, heavy mist of evaporation that is always present at the mouth of the bulb acts, however, as a shield to some extent. Lately, Dewar tried putting a few drops of mercury between the walls of the two bottles, with the result that in a vacuum the mercury vaporized and spread itself over the walls of the bottles. This acted as a mirror, and still more effectually kept out the heat. Tripler has arranged a set of cans of similar nature, which are covered with felt and canvas so that the liquid air may be shipped. The mouth of the can is also covered with felt, but this is safe, as it allows the gases to escape somewhat. Air thus packed loses less than one-third in a nine hours' ride.

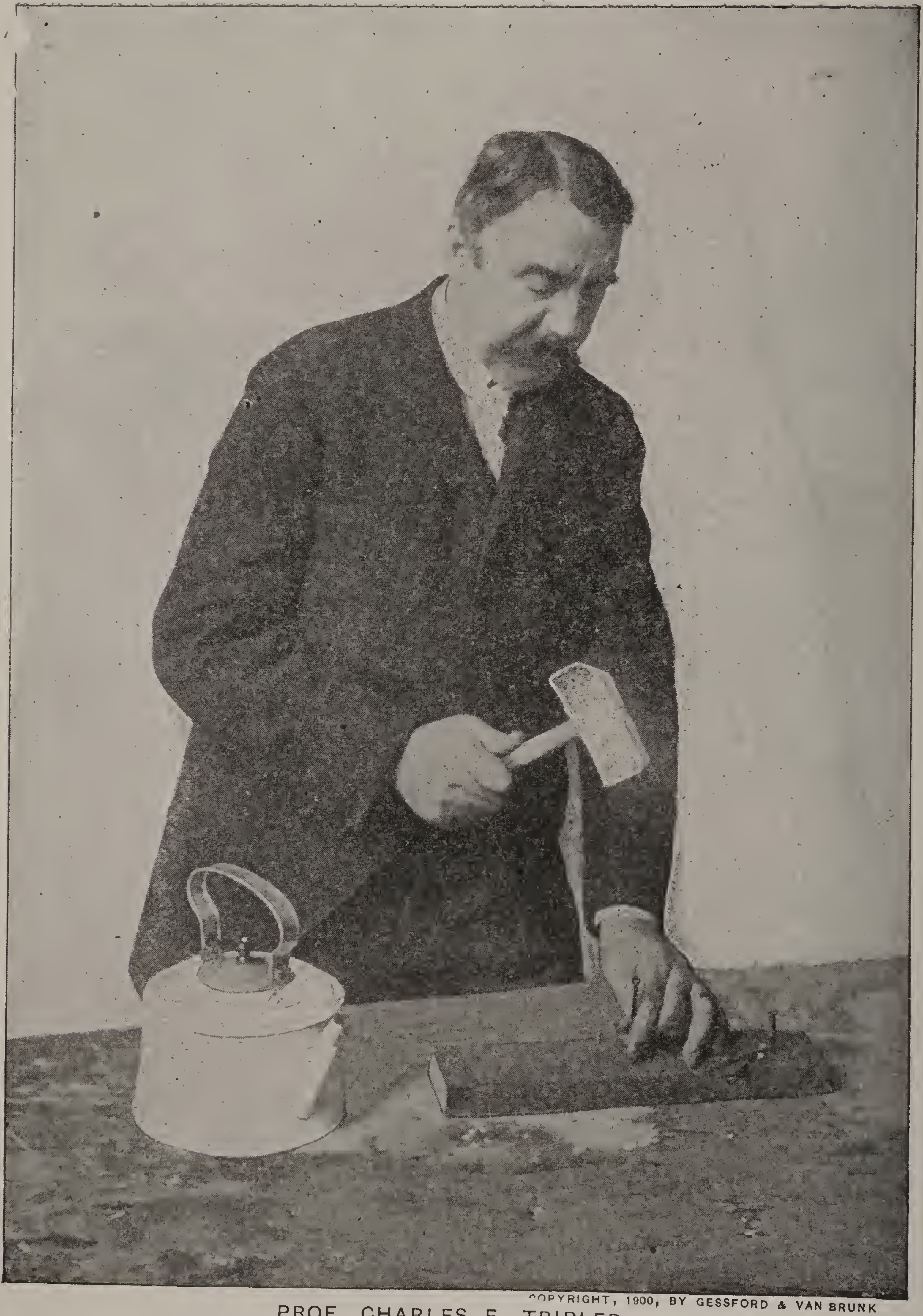
The Uses and Experiments

to which this wonderful discovery may be placed are as odd and interesting as the method of its production. The following are a few of its uses:

It is eleven and one-half times as powerful as compressed air, and may be carried in a pasteboard box, while as much energy in compressed air would need the strongest steel cans. It may supplant some forms of fuel, for, when mixed with any form of carbon, it burns rapidly or explodes. Thus it may be used in interior combustion engines—for instance, the gas engine. When a proper motor has been developed, it will no doubt be used to help solve the question of aërial navigation, for something that combines great power with lightness seems to be the only reason why air-ships are not a complete reality. The same may be said of submarine navigation. Here liquid air would supply the motive power, and the air for the crew to breathe as well, for a small quantity contains as much air as can be compressed into many great tanks. An automobile is now being made to run by this power. Deep-sea diving would also be aided by the use of casks of this air attached to the diving apparatus of the diver, thus doing away in a great measure with the pumps. In mines where water is likely to rush in at any time, it might be used to freeze the surrounding earth, thus preventing great catastrophes. In making such vacuum bulbs as those used for electric lights, liquid air would be very useful. After the air has been pumped out as much as possible, the remainder can be frozen into a solid drop at one end, and then the bulb may be closed above it by an ordinary blow-pipe, thus giving an absolute vacuum. The most frightful explosives can be produced with the combination of combustibles and liquid air, for oxygen is necessary to combustion, and this air contains it in vast quantities. Of late months, physicians and surgeons are singing the praises of this discovery, for by its aid a wound may be cauterized, or an excrescence "burned" away entirely. Odd experiments, such as freezing a rose in all its color and loveliness, or reducing an egg to a frozen solid that when handled will break up into a thousand fragments and the yolk scatter as the pollen of a flower, show what may be done in the laboratory.

LIQUID AIR BOILING ON A BLOCK OF ICE.

The temperature of Liquid Air being 312° below zero and the Ice 32° above, the latter is like a furnace in comparison.



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PROF. CHARLES E. TRIPLER

HE IS TO LIQUID AIR WHAT EDISON IS TO ELECTRICITY. THIS NEW AND GREAT DISCOVERY IS DESTINED TO REVOLUTIONIZE EVERYTHING PERTAINING TO THE SUPPLY OF MOTIVE POWER FOR TRANSPORTATION, MACHINERY, REFRIGERATION, MANUFACTURE OF POWERFUL EXPLOSIVES, ETC. THE ABOVE ILLUSTRATION SHOWS A HAMMER OF FROZEN MERCURY.

THE HORSELESS AGE.

AUTOMOBILES, MOTO-CARS AND OTHER AUTOMATIC VEHICLES.

The speed of an average railroad train made possible, with only good roads and clear right of way necessary. A vehicle that is destined to take the place, to a great extent, of horses, electric and cable cars, and cheapen as well as add comfort to conveyances.

THOUGH the manufacture and use of self-propelling vehicles are yet in their infancy, the industry is growing to such an enormous size that it is taking in half the carriage and wagon factories in this country. For many years attempts have been made to solve the problem of propelling wagons, carriages and other vehicles along the highways without the use of rails to run upon, and by some such motive power as steam, compressed air or electricity. Five years ago a few very expensive locomotive-like affairs had been turned out that operated with great fuss and feather, but were successful to the extent that large manufacturers employed skilled inventors to work out new ideas. Now we have the industry growing to great size, and such self-moving cars, wagons, trucks and carriages being used universally in the large cities, with the prospect of their invading the realm of the horse in the country before many years.

France at present leads in the use of these contrivances, and has a fashionable automobile club numbering 1,700. Recently an exposition was held in which 1,100 vehicles were shown, representing every sort and kind from a fashionable brougham to a milk-peddler's cart. The motive power in most of these machines is gasoline or naphtha, while those England has been putting out run mostly by steam. It has been left to America, as in most other things, to bring forth the perfect electric carriage. And this latter kind seems to give better satisfaction than any other, by reason of its safety, endurance and speed, extensive orders from Europe being proof of acceptance of the American models abroad.

To be worthy of consideration, the modern motor vehicle, no matter what its method of propulsion, should be odorless, almost noiseless, and free from jolting. Methods that are likely to result in explosions are being cast aside, and the weight of the motor, which is at present rather great, is being reduced as much as possible. Most of the carriages look odd to one seeing them for the first time, for, having no shafts or poles, they appear "bobbed" off in front. They are also rather too high for self-propelled vehicles, but soon they will have more graceful outlines and by having smaller wheels and less gearing the body of the vehicle will be nearer the ground. Of course, when a horse was attached to draw the wagon, it was necessary that the wheels be high enough so that the rider could see over the horse's back. And when these new methods for travel were first attempted, the carriage as it had been was made use of without much change in appearance.

(*Courtesy of Woods Motor Vehicle Co.*)

AN ELECTRIC AUTOMOBILE ON ONE OF OUR CITY STREETS.

In America, altogether there are six motive powers employed: electricity, steam, gasoline, compressed air, carbonic-acid gas and alcohol. The first three have been applied with success; the others are in their infancy, while the new power generator, liquid air, is expected to bring forth great power ere long, in a compact and very light form. The

Electric Mobile

is the one in most common use in this country, and possibly has the combined qualities of being more rapid, cleaner, and more nearly "fool-proof" than any other. The method employed for its construction is similar to that used on any electrically-driven apparatus: namely, a strong motor attached to the wheels, and propelled by electricity from storage batteries carried on the vehicle. Such a motor is odorless, almost without vibration, and is practically noiseless. It can run with great speed and climb almost any hill road so long as it is smooth. Of course, it is very heavy, owing to the use of storage batteries, and it can run only a certain distance without being recharged with electricity. These batteries weigh from 500 to 1,500 pounds each, the vehicle weighing from 900 to 4,000 pounds. An ordinary lady's phaeton weighs about a ton, and carries a battery of 900 pounds. When the battery is empty it may be recharged again at electrical stations maintained for the purpose, after which the carriage is ready for its journey once more. The current not only operates the motor at the wheels, but also lights the lamps, rings the alarm gong, and, in cabs, actuates a push-button bell for communication between the passenger and driver.

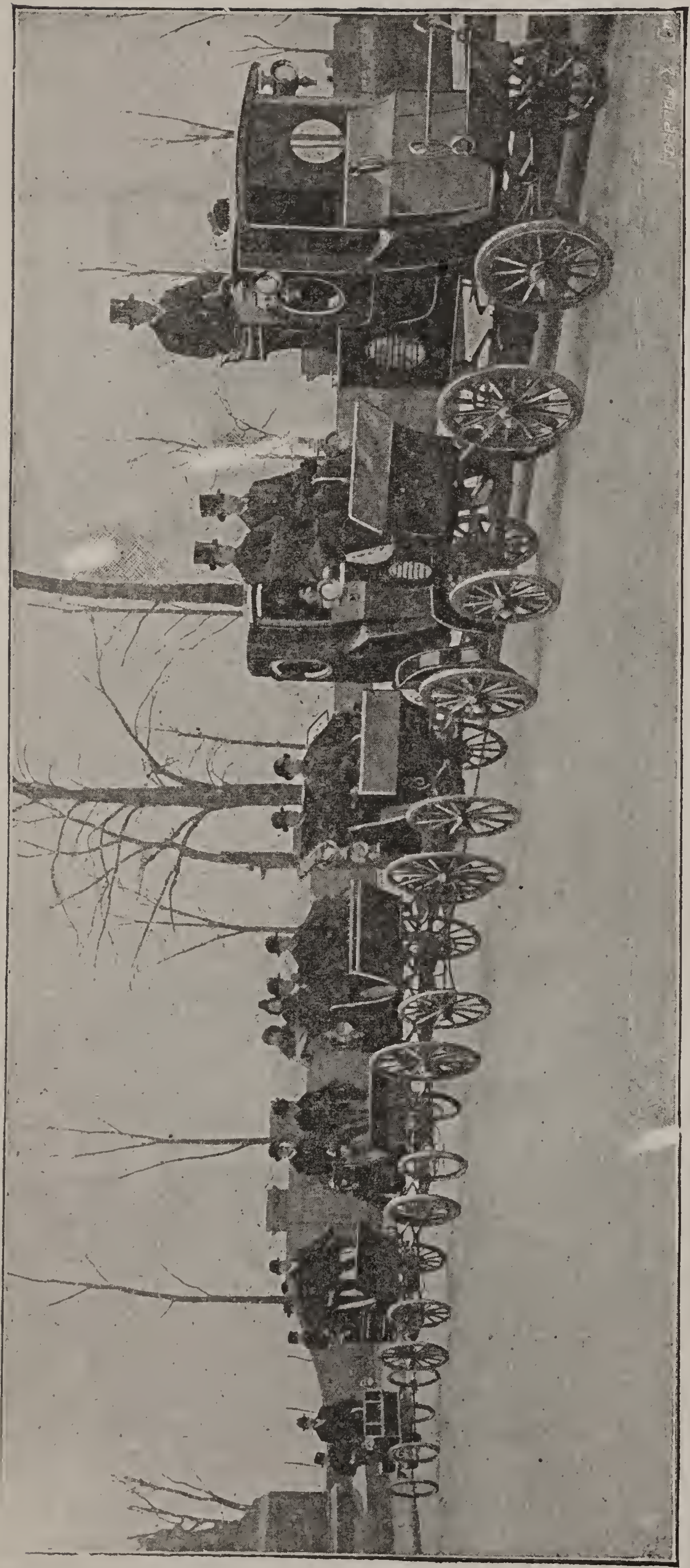
Aside from the device for supplying power to the wheels, there are numerous others for guiding and controlling the machine when it is under way. Near the seat of the driver are a number of switches and levers, which to one just learning how they operate are rather bewildering. In fact, schools are maintained where persons are taught how to manage these roadsters. In France a special highway is prepared with dummy figures in the path where the beginner is learning, the object being to become so proficient that none will be knocked down by the carriage running away. The driver must keep his eyes wide open and both his feet and hands busy. With his left hand he grasps the power lever which controls the speed, while with the right he manages the steering lever. He has one heel all the time on an emergency switch that cuts off the current, and at the same time must ring a gong to warn people of the approach of his pneumatic-tired conveyance. With the other foot he manages a reversing-switch that will back the carriage, while with his toes he applies a quick brake. When he wishes to turn on the lights he presses a button under the seat. So it may be seen that he is rather busy, and can never go to sleep and let the old horse carry him home.

In all the large cities lines of these electric cabs are being established. Most of them run from twenty to thirty miles without new current. It is a simple matter to recharge

The Storage Batteries,

it being necessary only to put in a plug connecting it with the generator, somewhat after the fashion of a bicycle pump. This may be done at almost any electrical plant, and in some places, Belgium for instance, regular posting stations are being established, while coin-in-the-slot "pumps" will soon be arranged on the corners of city streets where a broken-down battery may be refilled.

The gasoline motors are in some ways inferior to those run by electricity; though all the long-distance races in Europe have been made in vehicles thus propelled This motor is lighter than the other kind and needs no recharging station, gasoline being procurable at any crossroads at a small price. On the other hand, these engines are not self-starting, a push on the piston rod being necessary, and then the carriage throbs under the motion of the machinery. The ins and outs of all the machinery must be thoroughly learned, and one really becomes an experienced engineer before he masters the art of guiding this sort of automobile. When one has learned, how-



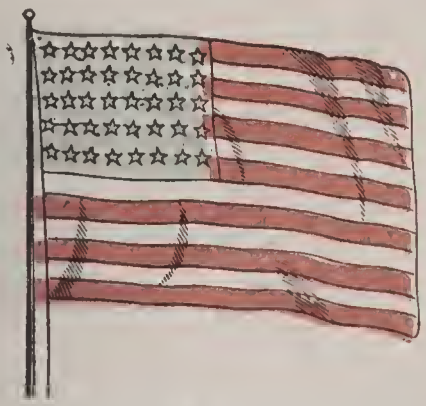
DIFFERENT STYLES OF AUTOMOBILES PASSING IN REVIEW, SHOWING THE DESIGNS BUILT BY THE WOODS MOTOR VEHICLE CO., CHICAGO.

ever, he is master of the situation, for he may travel up to fifty miles an hour on smooth roads, and through mud and other difficulties at less speed, with the aid only of a can of gasoline

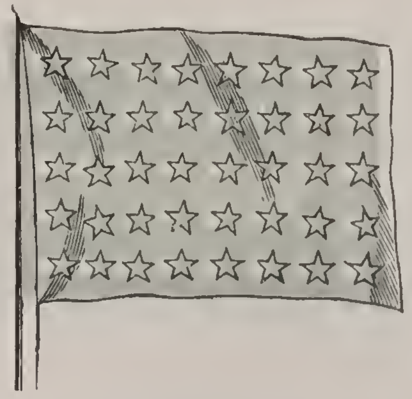
The process of

Power Generation by Gasoline

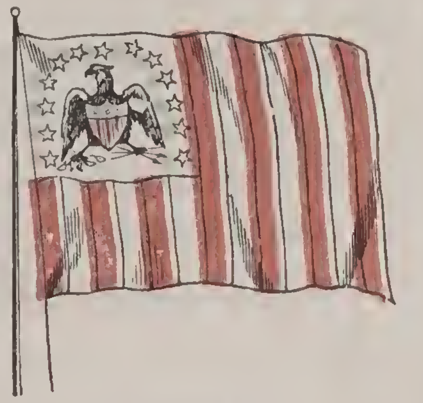
is very simple. It is known that this liquid mixed with certain quantities of air and confined will, when ignited, explode with violence. A cylinder is devised which admits this combination at one end, the gas is exploded at the proper time and drives out the piston rod, which in turn causes the fly-wheel to revolve, drawing the piston back to its old place once more, after which the operation is repeated. Most of these engines operate under four cycles or impulses. During the first the vapor is drawn into the cylinder during the second it is compressed by the return piston; during the third it is exploded, and in the fourth the products of the explosion are driven out, and the cylinder is ready for the new charge. In most engines the explosion is caused by an electric spark, there being no fire on the vehicle. Owing to the heat generated by the explosions going on all the time, the machinery must be kept cool by being cased in water jackets. I



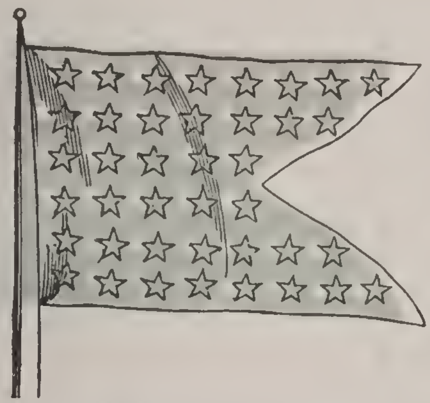
UNITED STATES.



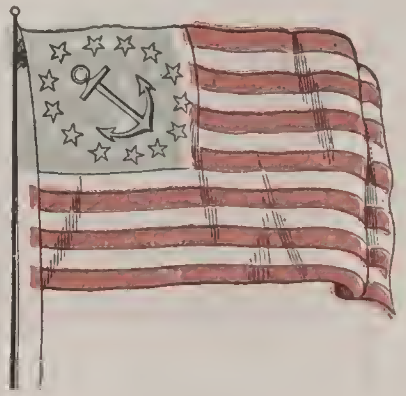
UNION JACK.



U. S. REVENUE.



U. S. COMMODORE PENNANT.



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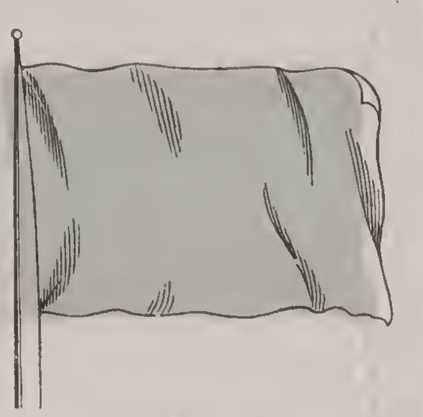

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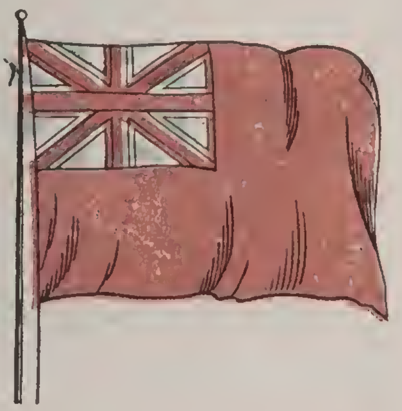

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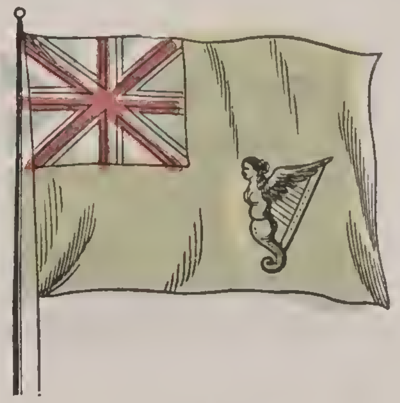

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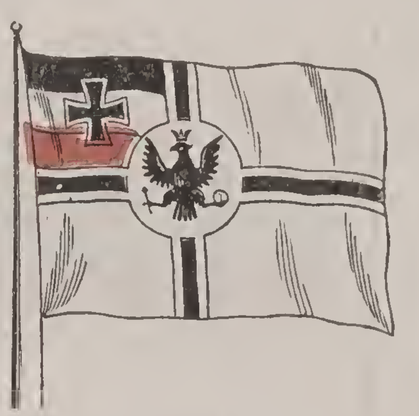

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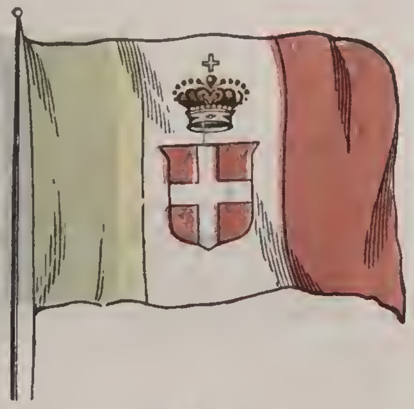

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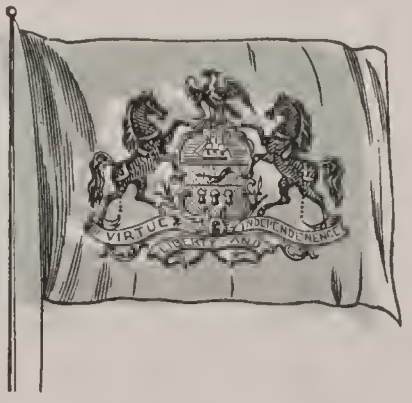
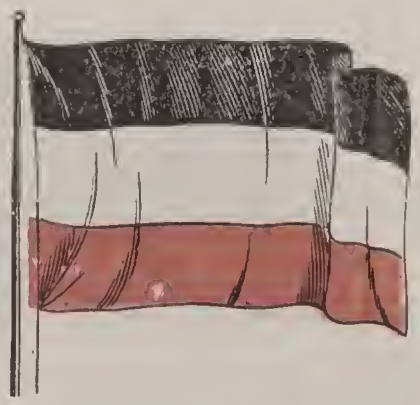
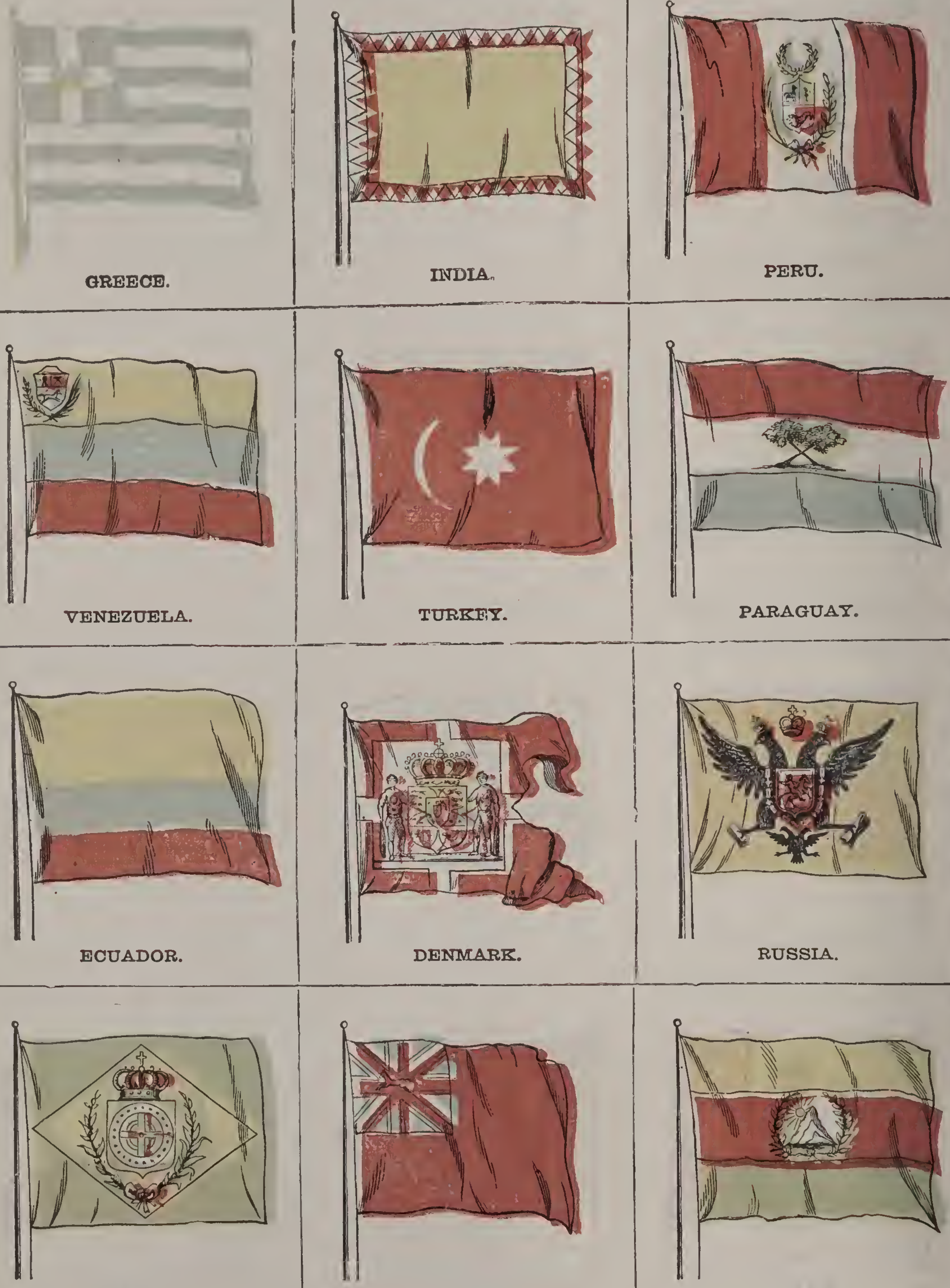


PENNSYLVANIA STATE.



GERMAN MERCHANT.

FLAGS OF ALL NATIONS.



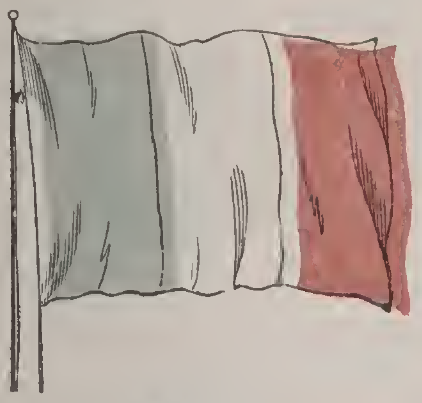
GREECE. INDIA. PERU.

VENEZUELA. TURKEY. PARAGUAY.

ECUADOR. DENMARK. RUSSIA.

BRAZIL. HANOVER. BOLIVIA.

FLAGS OF ALL NATIONS.



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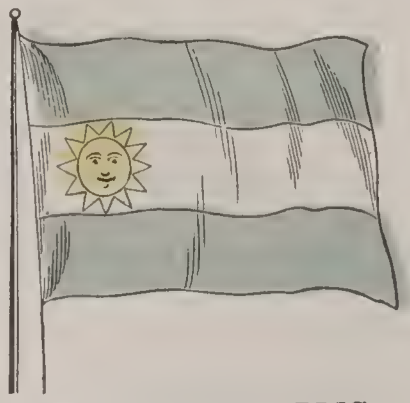

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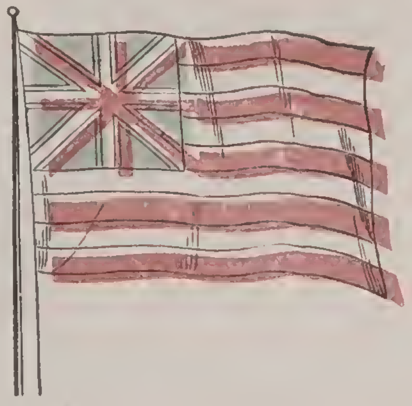

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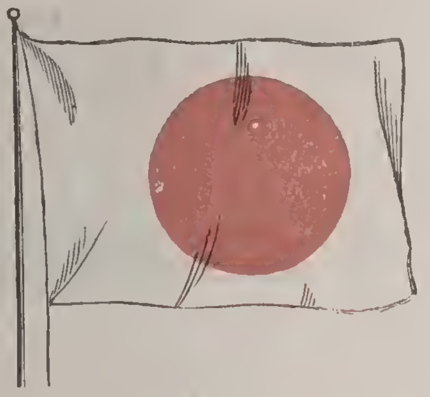

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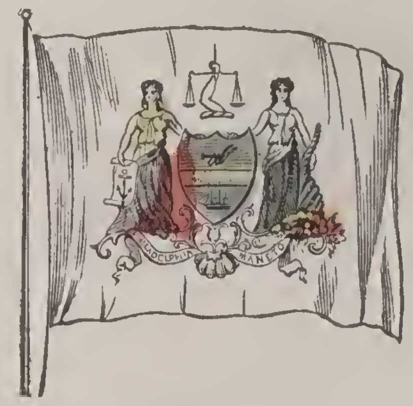

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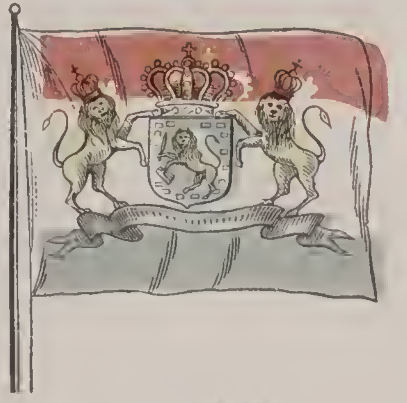

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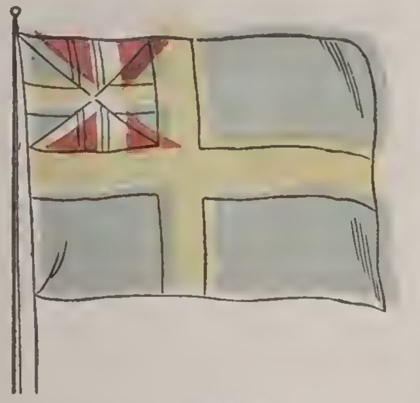

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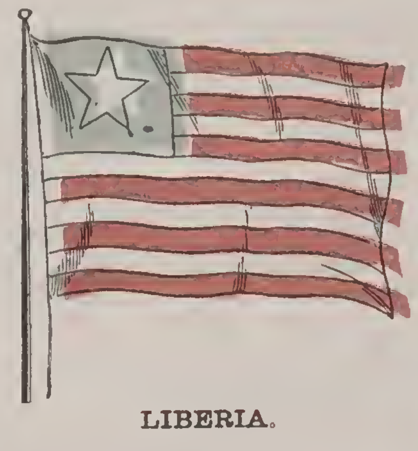

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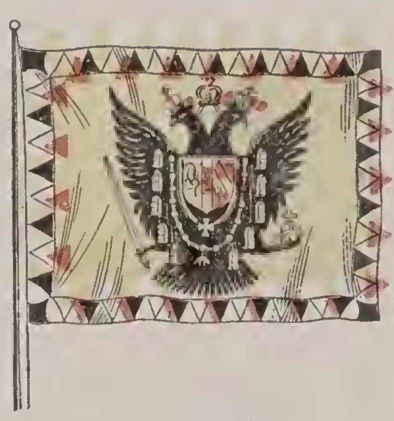

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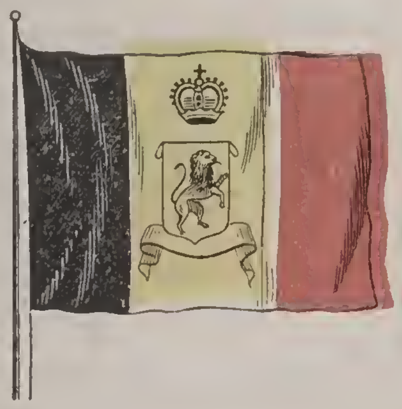

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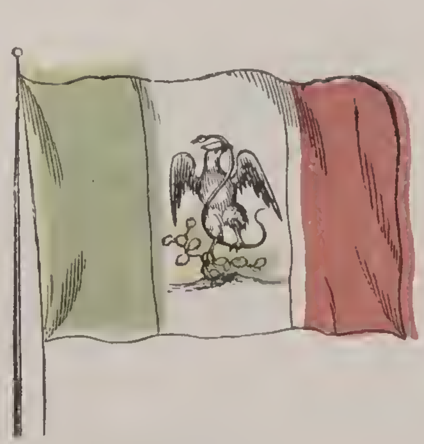

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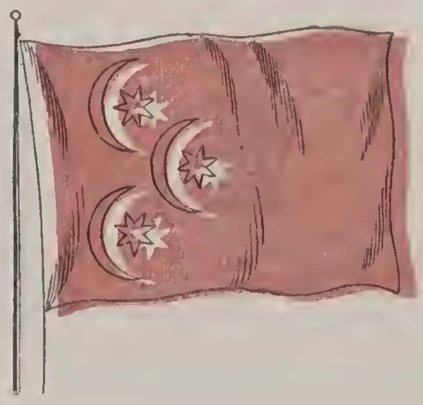
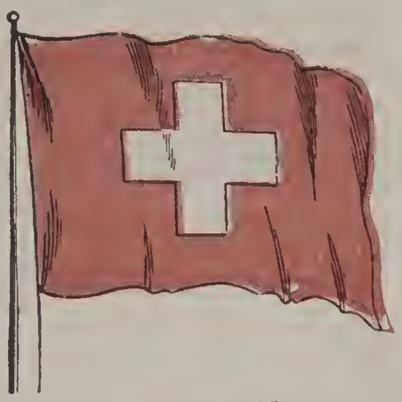


EGYPT.

FLAGS OF ALL NATIONS.



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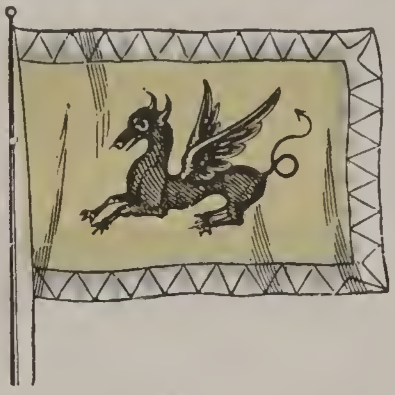

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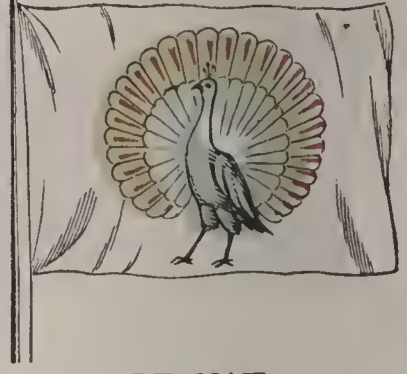

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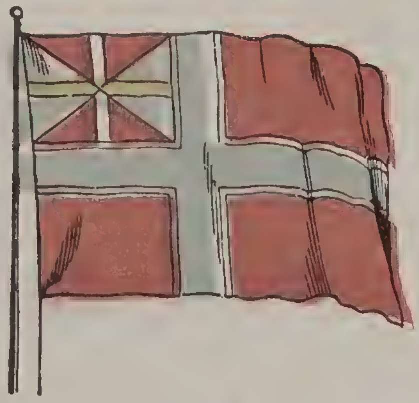

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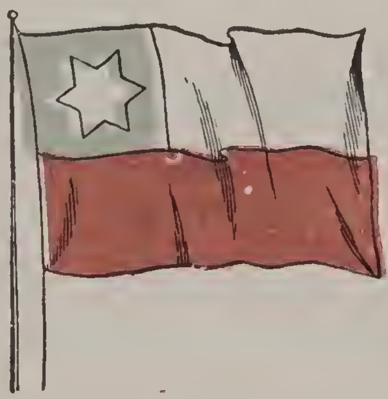

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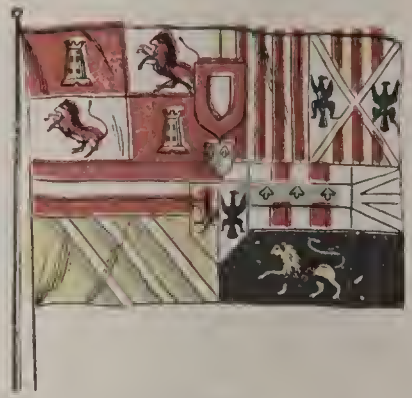

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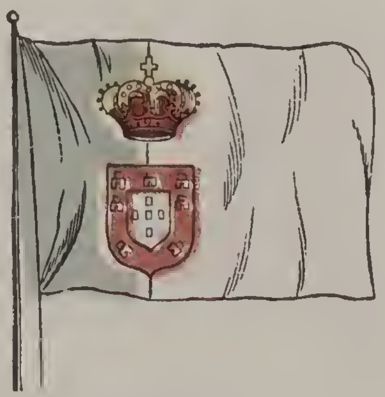

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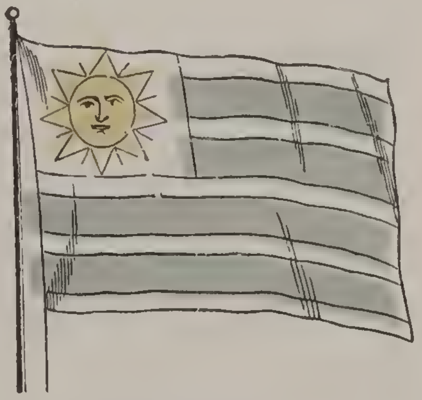

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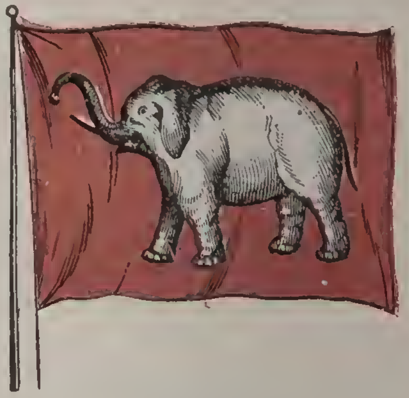

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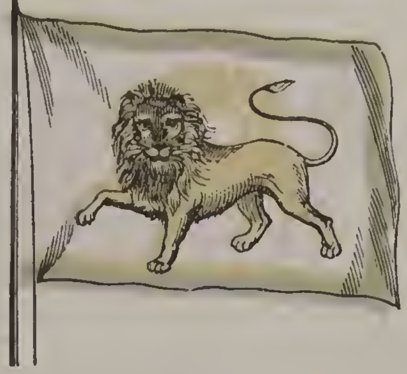
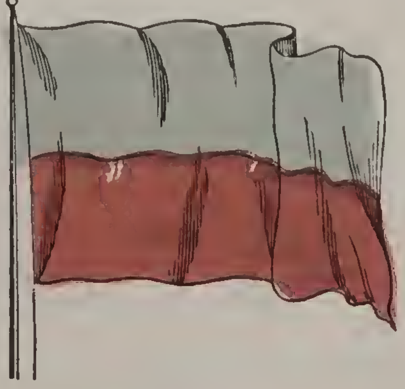
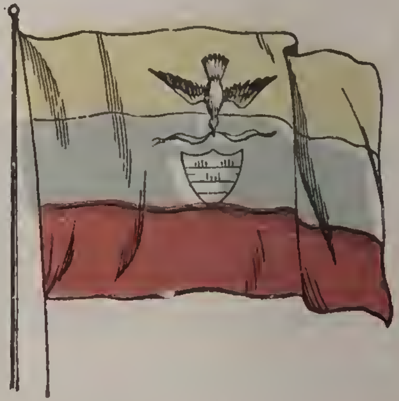


PERSIA.



HAYTI.



NEW GRANADA.

FLAGS OF ALL NATIONS.

some cases the spark is done away with by having the compression of the gasoline so great that it explodes of its own heat. Different devices are made for mixing the proper quantities of gasoline and air, and many improvements are going on in general to do away with odors, vibrations and the like.

The cost of owning and operating automobiles for a period of several years is really considerably less than that of horses and carriage, and especially is this true of the gasoline kind. Many of the gasoline vehicles will run 100 miles on a half-dollar's worth of liquid.

Steam engines have been used to some extent for both trucks and pleasure vehicles with success. For the latter, however, they are not as yet in the stage where they are desirable, there being a great deal of complicated machinery to run which requires a regularly licensed engineer; and then there is generally a puffing sound and escaping steam at the exhaust pipe. However, for traction engines, trucks, fire-engines and omnibuses, they have proved eminently successful, because of the ease with which fuel and water may be had. As yet,

Compressed Air

is rather cumbersome to handle. One truck has been constructed which has a set of cylinders operated by this method somewhat after the style of steam. The compressed air is held in huge steel storage bottles or tubes, which are carried under the wagon. Difficulty has been had from the freezing of the valves when the air is turned on and escapes rapidly. This is because of the great reduction of the temperature about the pipes when the air expands and sucks up latent heat. To avoid this a system of hot-water pipes heated by a gasoline flame is arranged, that keeps the valves from cooling too much. Because of the great weight of these trucks they are as yet not much used. However, improvements are being made daily. One inventor has arranged a small gasoline engine that generates electricity in the front of a truck and stores it in batteries at the back. From these storage batteries the current is drawn which runs an electrical motor. This truck weighs, however, over 9,000 pounds, and when loaded about 25,000 pounds, making it a serious question for good pavements.

The Uses

to which automobiles are being put are numerous and varied. All sorts of pleasure vehicles are already in use, together with cab and omnibus lines in competition with street-car lines. A railway hand-car has recently been put in use, of the gasoline velocipede type, capable of carrying three persons at the rate of thirty-two miles an hour. The Parisian fire department uses an electric automobile the battery of which is only one-fifth the weight of the whole apparatus including the crew. It is capable of traveling four or five hours at the rate of twelve miles an hour. In other fire departments many of the light buggies of the chiefs and marshals are driven by electricity, and run from forty to fifty miles per day. The post offices of several of the larger cities are now using autowagons for delivering and picking up mail, while nearly all the great department stores use electric wagons exclusively in their delivery business. The War Department at Washington has recently taken official cognizance of the automobile by ordering several wagons for the Signal Corps, and soon it is expected ambulance and ammunition wagons will be ordered of the same kind.

It may readily be imagined what will be

the outcome of these marvelous strides in perfecting self-propelling vehicles. It means better pavements and roads all over the country, and in the city before long the noises from the harsh rumbling of wheels and the crash of the horses' hoofs will be replaced by the rapid swish of the pneumatic tires.

(*Courtesy of the Woods Motor Vehicle Co.*)

A TRIP INTO THE COUNTRY IN AN AUTOMOBILE OF THE ENGLISH TRAP DESIGN.

Already capital to the amount of $400,000,000 has been invested in the manufacture of these vehicles in New York, Chicago, Boston and Philadelphia. Laws have become necessary for their regul tion. In France they must be license and the driver must have a certificate proficiency. Speed must not exceed 18 miles an hour in open country, or 12 miles in passing houses, while in narro thoroughfares it must be reduced to walk ing pace. All sorts of names are being pr posed for this style of vehicle, from "horse less wagon" to "self-propeller" and "aut car." It seems, however, that the Frenc "automobile" has come to stay.

MARVELS OF THE RAILWAY.

GREAT WEBS OF STEEL BRIDGING VAST CONTINENTS,

Giving the North the fruits of the tropics fresh from the trees and vines, the South the grains and other products of the colder climes. Uniting the East and West by shortening the time, making travel a luxury and lessening expense.

DOWN to 1850 progress in railway building was very slow, but shortly after came a great "boom" in stocks, and the succeeding 1865 were noted for vast strides in railway improvements construction. Seventy years ago were not twenty-five miles of rail in vhole country; to-day the total mile- f the United States arly 200,000. This bout half the number iles in the whole rl.

1850 nearly all the s were confined to North Atlantic s, but in the next de a number of were pushed west e Mississippi, and ly after came the great transcontial system to the fic. The railroads in the west were ssarily forerunners civilization, and e the engine had go under armed guard to keep off the attacks of the Indians, it was not to be expected that construction would be other than cheap. Towns did not have to be consulted as to rights-of-way, for towns followed rather than preceded the railroad. As years went on, however, this cheap method of building was thrown out for new and modern improvements, and to-day every-

(*Courtesy of C., B. & Q. Ry.*)

MODERN A LA CARTE DINING CAR.

where old wooden culverts are being replaced by steel bridges, secure rock ballast is taking the place of the bedding that was formerly so easily washed out, and heavy and continuous steel rails now form even and smooth tracks, instead of the old warped iron affairs. Curves have been straightened, steep and dangerous grades have been abandoned for cuts and tunnels, and instead of the murderous grade-crossings we are now being supplied with elevated systems and block signals. All this takes enormous wealth, but the roads are constantly increasing in that direction. It is true that many improvements are yet to be expected, even with our "lightning flyers," ere travel will become perfect, but these improvements will be along the lines of the already existing roads, rather than along new lines yet to be laid out.

(By Courtesy of the "Burlington Route.")

A GENTLEMEN'S CLUB ON WHEELS.

Interior view of a modern buffet and smoking car.

If construction in the number of miles laid out has been great, even grea been the development in the

Luxury and Ease of Traveli

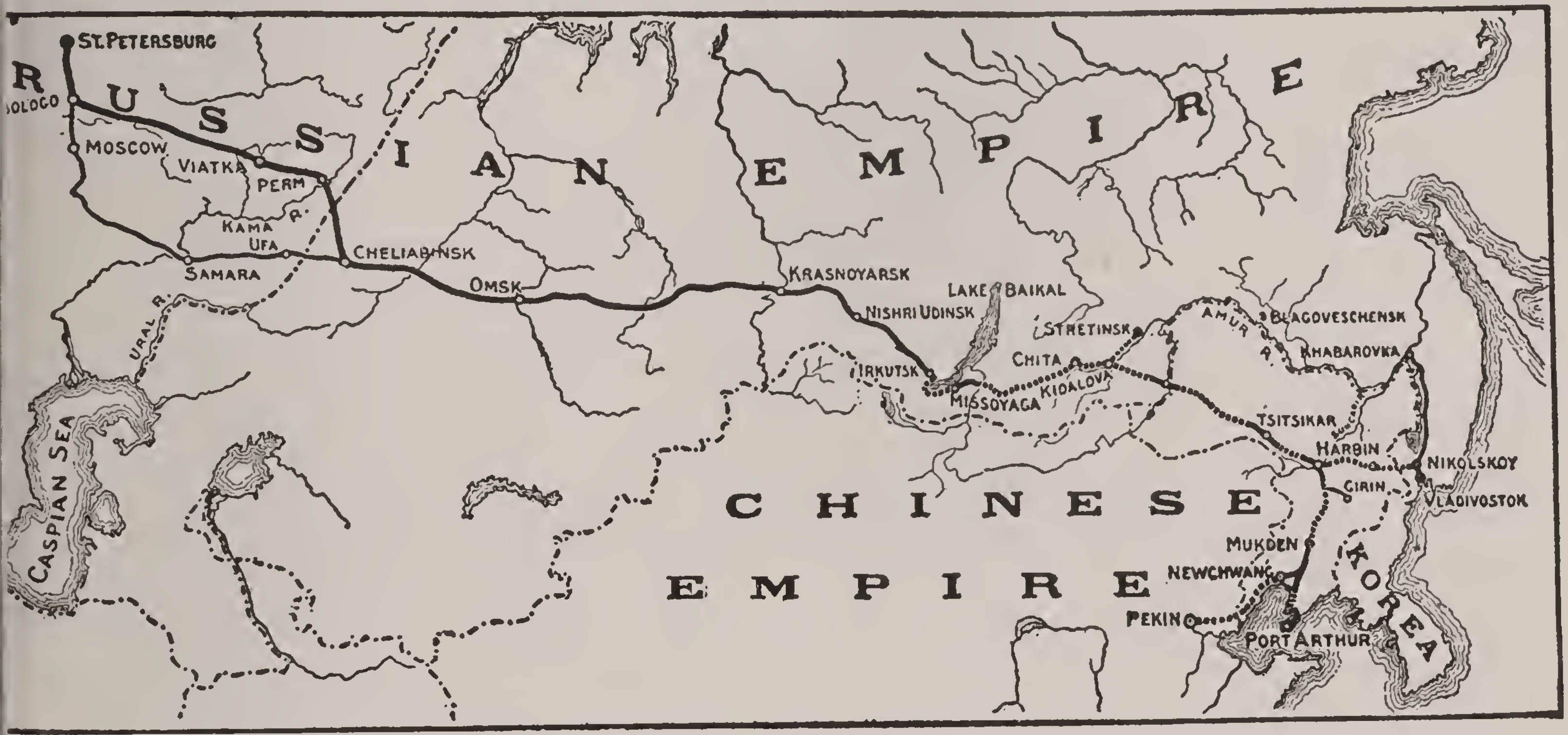
Some forty years ago the continuo rail had not been invented, and th connected cars clattered along ov disjointed rails with a rattle and that was nerve destroying. The on veniences then provided for, even "through trains" across the country a few telegraph b a separate sm apartment, and, i cases, a buffet which were serve and drink of poor ity and enormous The night train thing unheard o the Pullman sle had not yet ma appearance. To one journeying coast to coast hardly give a th as to his comforts he has boarded modern cross - co "flyer." Train now really al smooth - running, are equipped with device for comfort man can imag Drawing-room, observation, dining, sleeping cars arranged with an ey artistic effect as well as to luxurious fort, are ever being improved upon b companies, while electric and gas li vestibules between cars to keep out and dust, barber shops, buffet smo cars, card rooms, and libraries and m rooms, with waiters and porters at e turn, are daily adding to the ease travel, as well as to the pocketbook the railway magnates.

New Construction.

think, then, that all these devices oon be applied to trains of cars run- egularly across every continent on lobe is to wonder what will be the of man's power. To-day there are urse of construction two marvelous one, the Trans-Siberian route, laid by the Russian government St. Petersburg, Russia, to Port r, China, thus taking in all the rces of unknown Siberia and China; ther, the "Cape to Cairo" route, as ly partly built and partly on paper, marvel in imagination, extending the Cape of Good Hope, at the most ern extremity of Africa, up through own savage lands to its northern nal at the old capital of the Pharaohs, Egypt. Besides these two great takings, there is one of similar being promoted by American cap- hat is to be called the Interconti- Railway, or the Pan-American At the expense of $25,000,000 to connect this country with the American states, starting from noras, on the Rio Grande border, running along the gulf coast to Guatemala, then along the border and down through the South American states to the Pacific coast, thus making a thread line from North to South America.

Trans-Siberian and Chinese Eastern Railways.

Had Russia imagined in 1867 that she could ever have accomplished such a work of engineering skill as that of the construction of the Trans-Siberian and the Chinese Eastern Railways, she never would have sold to the United States for the paltry sum of of $7,000,000 the great territory of Alaska. Instead she would have been our neighbor, with a seaport at Fort Wrangell, almost at our doors on Puget Sound, and England, with ever-watchful eyes, would turn from Russia at the gate of Herat to Russia within a day's march of Vancouver. But the first work of building this great thread across a continent full of superstitious semi-savages was not commenced till May 30, 1891, when the present Emperor, then Czarovitch, on his way around the world, visited Vladivostok and drove the first spike. It was then thought that the



A MAP OF THE TRANS-SIBERIAN AND CHINESE EASTERN RAILWAY,
howing the entire route from Port Arthur to St. Petersburg. The dotted line marks the course where work is not yet completed.

Trans-Siberian could not be completed till 1905 or 1907. That was before the Chino-Japanese War, and a route had already been mapped out along the southern border of Siberia to Vladivostok, a port on the Pacific just north of Korea that is ice-bound all winter. This port was practically the only outlet for Russia on the Pacific, and accordingly great outlay was made for piers, ice-breakers, etc. But after Russia's aid to the Chinese in the war with Japan, China felt very grateful, and as a mark of esteem gave her benefactor great privileges in Manchuria, among which were the rights to build the Chinese Eastern Railway and to lease Port Arthur as its eastern terminus. This port is open the year round, so Russia at once gave up her other surveys along the Amur River, and instead began to throw out a line of roads to the southeast through the most fertile part of China, to end at Port Arthur, and with branches to Pekin and Vladivostok.

The Trans-Siberian Road

itself is practically complete, and after an expenditure of $150,000,000 has a through line from Irkutsk, on Lake Baikal, extending 4,000 miles to St. Petersburg. Across the lake to Missoyaga trains are being carried on great steel barges or ferryboats. Beyond this point the road runs in more or less complete state in an easterly direction to Stretinsk, and from the port at Vladivostok directly northward to Khabarovka. The country lying between this latter point and Stretinsk was to have been covered by a line that would have directly connected St. Petersburg with Vladivostok. But with the donation from China, as said before, this line was abandoned, and now the eastern terminus of the Trans-Siberian route is at Stretinsk, while a little to the south and west of this point, at Kidalova, the main Russian line
is tapped by the Chinese Eastern Ra
The work across Siberia was
difficulties, much of the land neve
ing been traversed by white men
Convict labor has been used to a
extent, thereby cutting down ex
Expense has not been spared in the
however, to give good constructio
above all else is considered
Bridges that are marvels in civil
neering span numerous rivers be
Stretinsk and St. Petersburg, twent
lions having been expended in thi
alone. The largest and most cos
these is the great iron and stone
that spans a distance of 3,150 fee
the Yenisei at Krasnoyarsk. It star
five colossal circular stone piers,
matching stone abutments, and is t
over the river in five spans. Th
was $2,300,000; the work was de
by Knorre, once a German, but
naturalized Russian. Another
bridge, costing $2,000,000, extends
the Obi River at Kolivan. Durin
winter, when the rivers are deeply f
such parts of the road as yet ha
bridges are strung temporarily acro
the thick ice, and later are replac
steel culverts.

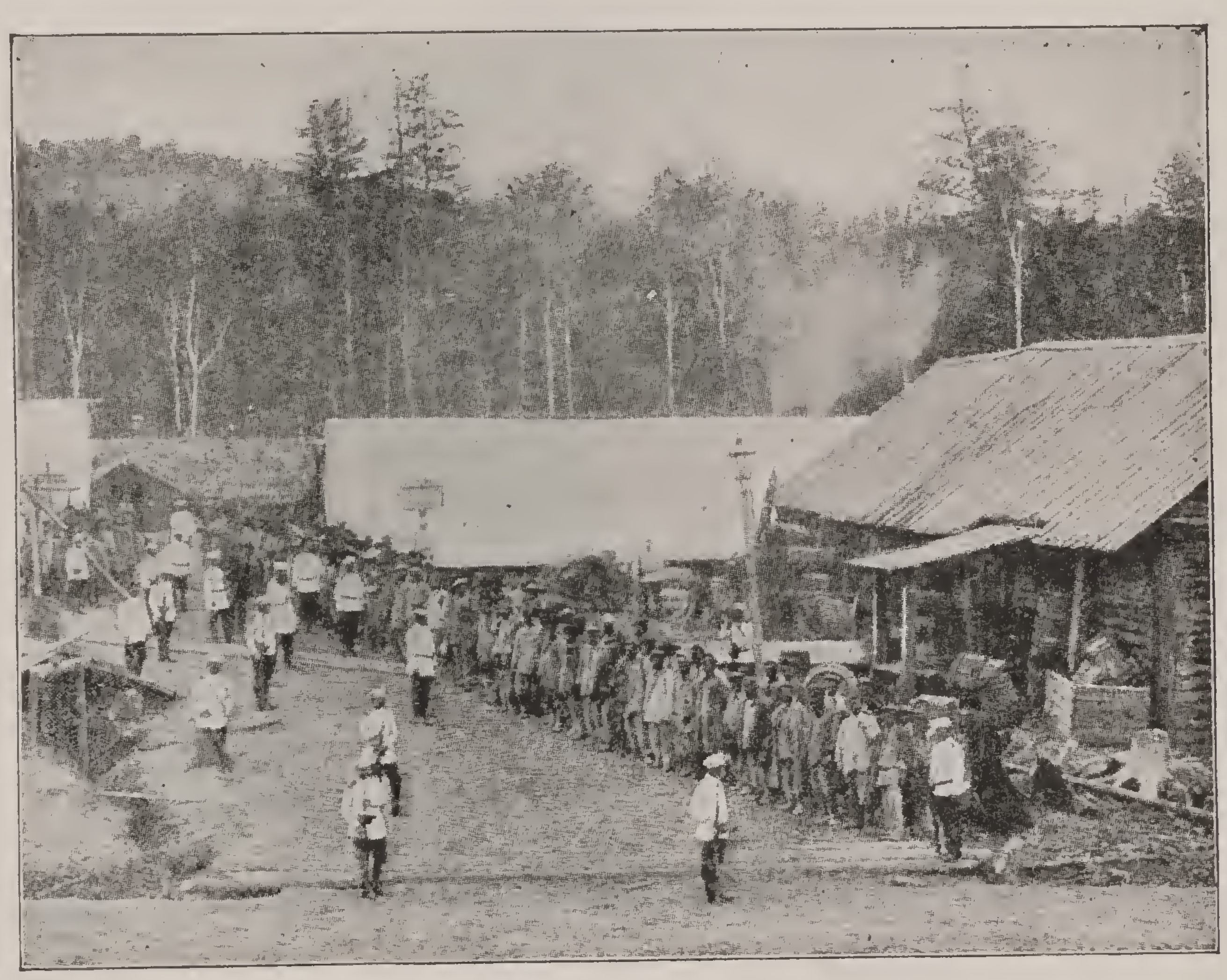
The work of most interest at pr
however, is that upon the

Chinese Eastern Railway.

which, though in direct conjunction
the Trans-Siberian road, is yet
entirely separate in its finances an
ward dealings with the public. I
Russia contracted with China to b
road through Manchuria, guaranteein
the president should be a Chinama
that at the end of eighty years the
ownership of the road was to pass to
upon payment. The route was at
mapped out, and for rapidity of con
tion this line holds the record. The

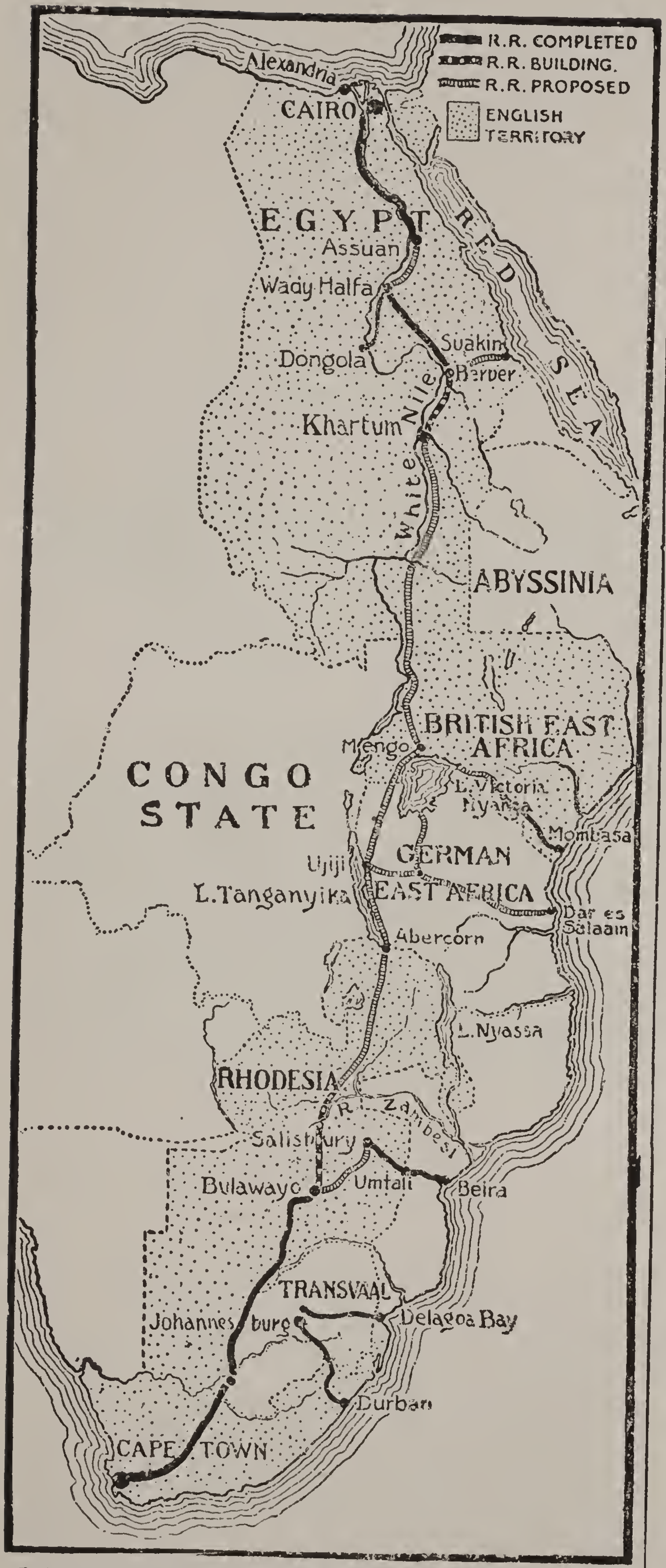
being done by both Siberian convicts l Chinese coolies, while almost every l and modern means of equipment of American manufacture. The ards along the route are mainly Cos- ks, and they dress half in Chinese and f in Russian costume. The flag of the npany is likewise half of one country l half of the other. Of course, the en- prise is wholly Rus- n; and the result of s enterprise is start- g. Cities have wn up all along the ntry that was for- rly wilderness. To nk of the wonderful ilizing effect of this ilway is startling. e road covers like a d 400,000 square les of rich Chinese ritory. The main e extends southwest m Kidalova to Vladi- stok, while about mid- y it is tapped by a di- tly southern branch a new town called bin. From this point runs to Port Arthur d to Pekin.

Work on the new te is continued roughout the winter, aided by the use American tools and supplies. Euro- an methods are in the main crude along gineering lines, and American enter- ise supplies this work with nearly erything from steel for bridges to pick- es and cross-ties. Rock drills caused a eat deal of trouble, however, among the tive Chinese and also to some extent nong the convicts. It was impossible r these ignorant people to understand e workings of such an engine without visible motive power, and they at once came to the conclusion that the work was done by the white man's "slave devil." The result was that 10,000 workmen struck, and it was only with the greatest difficulty that they were induced to return to work. Eventually they became amused at the workings of the machines, though they still think them controlled by evil spirits. What has already been accomplished by the construction of such a great railway may be shown by noting that Habin, the junction of the two great railways, as well as headquarters of their officers, was not on the map at the close of 1899, and yet it is destined to be the Chicago of northern Asia. Already in this city are magnificent office buildings and dwellings, and broad and electrically lighted streets are to-day being paved in the most improved methods. Palatial



A CONVICT CAMP ON THE TRANS-SIBERIAN RAILWAY.

A Cossack guard is about to conduct a body of convict laborers to their daily task. This class of labor was largely used in the construction of the Trans-Siberian Railway.



LATEST MAP OF THE ROUTE OF THE "CAPE TO CAIRO" RAILWAY,

Showing also southern countries now involved in war with Great Britain.

steamships arrive and depart daily, machine shops, banks, ice-factories other enterprises are numerous. To up the gigantic effort, a trip of 10, miles, or nearly half-way round the wo can soon be made without changing c

The Cape to Cairo Railway.

Were English capital being invested the building of the Trans-Siberian Chinese Eastern railways, we might the value of the speculation, for it is o that nation that has colonies scattered over the globe that will greatly benefit easy means of communication betw them. Russia, however, is not build these great distance-bridging webs steel for the money there is in it; rat for the purpose of bringing her gr domains together. But if Russia is o laying millions of capital in a cos venture, England is risking still more the scheme to build a railway through the length of Africa from the Cape Good Hope to Cairo. Cecil Rhod the genius of South Africa, promulga the idea, and though capital has be scarce for the purpose, yet the time is n more than ten years off when the m gigantic of all daring feats will have be completed. From point to point t distance to be covered is about 6, miles. Of this over 3,000 miles is alrea constructed, but the remaining portio 3,200 miles, is yet to be strung across t most difficult stretches of land in Africa. The total cost of the wh enterprise is estimated at $125,000,000, b as the northern and southern extremit are already laid, it will need only abo $75,000,000 more.

And there really seems no reason f building this middle section now eithe In the south from Cape Town to Bul wayo, and on the southeastern coast fro Durban, Delagoa Bay, and Beira into t terior where the lines have already een built, there was some reason for an tlay of capital, because of the great sources of the country, especially the ld and diamond fields. Likewise on e north it has been necessary to run es to the south because of their value r the military in subduing the Mahdi. t from Khartum or Berber south along e White Nile and through the malarious ke regions, where the underbrush has t no trail of the white man, it seems lly thus to put up a road over which ere is no likelihood of traffic. At the st, the time of travel from Cape Town Cairo and then by water to London, ll take fourteen or fifteen days, at a avy expense and with discomfort across e deserts, while the whole trip can now made cheaply by steamer around the st coast of Africa in but two days more. owever, the road is being built, and as ch merits admiration.

The English government is not the sher in this enterprise; whatever ma- res of the marvelous scheme will be due the domineering pluck of

Cecil Rhodes.

hen he first conceived the idea he ured on making a forerunner of a tele- aph line. This had money in it, and ough set upon by great obstacles, odes has the line well under way and endangering the revenues of the sub- rine cable lines to the Cape. The only ace that he had great difficulty in securg right of way for the telegraph was rough German East Africa. Here, for e privilege of running his own wires, he st also at his own expense run other res for the German government, which ey will keep up at his expense for forty ars, and then they go to Germany thout compensation.

From a point on the Zambesi River in Rhodesia it is planned to run the railroad north to Abercorn, then along Lake Tanganyika to Ujiji. From this point it will cross to Mengo in British East Africa, and then probably skirt the western edge of Abyssinia, avoiding as much as possible the malarious districts. Completed roads to Assuan in Egypt existed before the recent trouble with the Mahdi, and when General, now Lord, Kitchener, Sirdar of the Egyptian army, started from Wady Halfa towards Khartum, other lines were thrown out to transport the army and its supplies. As it is, completed lines now practically cover the district to Berber, and a road is being run to Khartum.

January 20, 1909, is set as the day for the laying of the last rail in this great stretch of track. This gigantic enterprise is likely to add greatly to the domain of Great Britain in that part of the world.

Ninety Miles an Hour.

Speed on railway trains has been developed to at least ninety miles an hour between stops on level road. This has been done in actual work of carrying mails, and was the outcome of a race against time that took place January 1, 1899, on both the C., B. & Q. and the Northwestern railways on their respective lines running from Chicago to Omaha. With our new possessions in the Pacific Ocean any time saved on the way to the coast is of importance, and it was to secure mail contracts to these points that such speed was shown. It is no uncommon event to-day to travel at the rate of over fifty miles an hour, including stops, but extremely high rates of speed are not usually developed on passenger trains. When ninety miles are whizzing past in sixty minutes it taxes to the utmost the nerves of the engineer. All sorts of sights and noises are magnified in the night, and even if engines are improved to fly at the rate of 150 miles an hour,—which it is said will before long be possible,—the driver of the engine would be able to run his train only a few years before he would be a physical wreck. With the improved headlights shadows are increased, and though the long stream of light aids in detecting breaks on the track at night, such a thing as a small fly traveling over the face of the lamp enlarged to great size in a shadow on t track. The wind whizzes by, and wh another train at an equal speed of nine miles an hour from an opposite directi passes by, the two are coming togeth at the rate of 180 miles an hour. With a these strains, the engineer wishes to r duce rather than to increase the speed.

(Courtesy of C., B. & Q. Ry.)

NINETY MILES AN HOUR.

"Burlington Route," Denver Limited Express Train.

Wireless Telegraphy.

MESSAGES SENT ACROSS SPACE, OVER WATER AND THROUGH MOUNTAINS WITHOUT THE AID OF WIRES.

Bridling one of the most delicate forces of nature, and making it do marvels in the service of man.

SINCE the perfection of the telegraph and telephone for commercial purposes, and the laying of cables across the ocean for the transmission messages, electrical experts have been dying the problem of transmission of ctrical energy for messages without res. Gray devised a method of send- signals along light waves, and others ed transmitting telegrams to moving ins by means of the rails. These thods, however, were not successful the main, and it was left for

M. Guiglielmo Marconi,

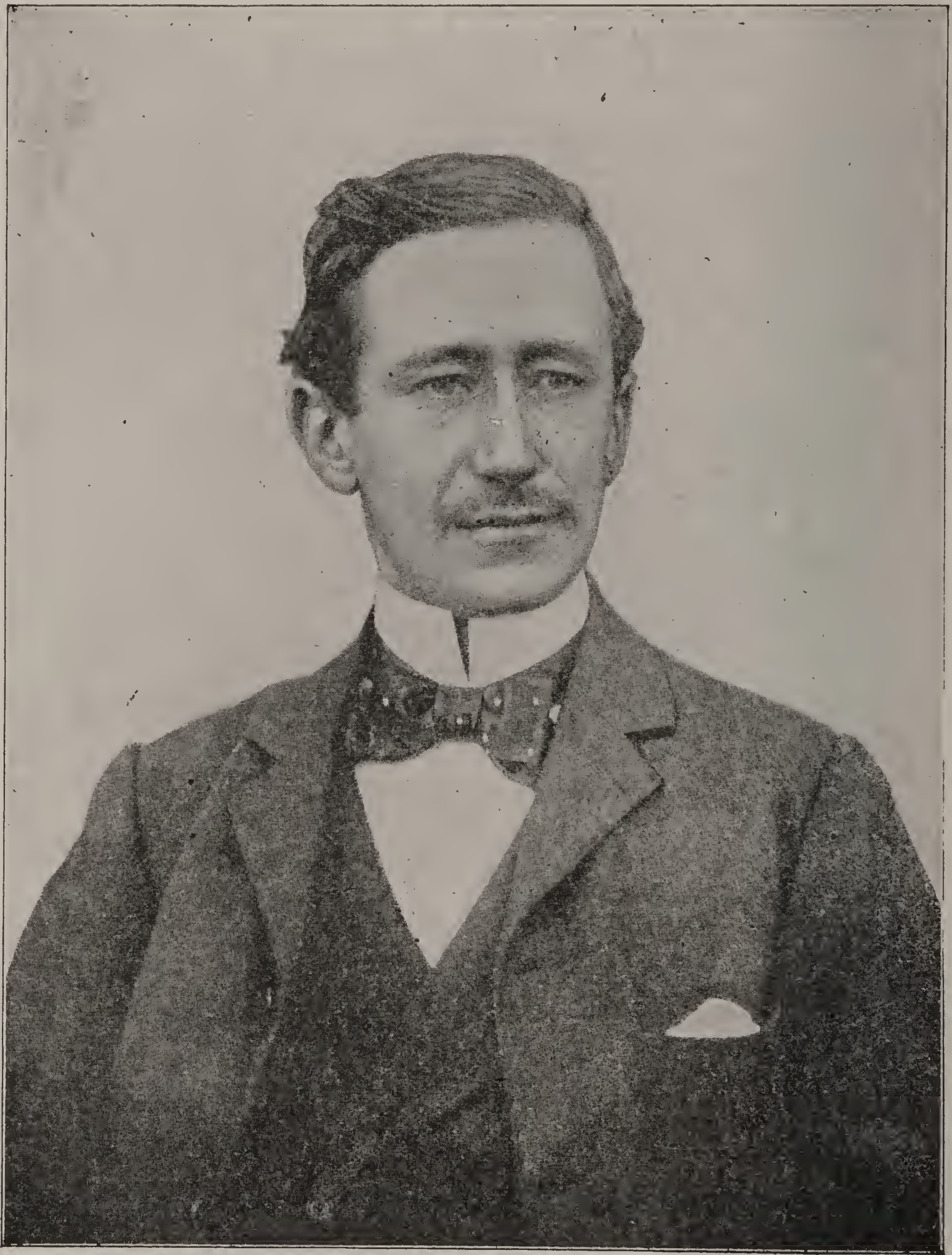
Florentine yet in his twenties, to dis- ver that Hertzian waves could be nerated from electricity and sent across ace without the means of intervening res.

In 1895, while yet quite young, Mar- ni made experiments across his father's lds in Bologna, Italy, and by the use of n boxes, called "capacities," set upon les of varying height, and connected to parate instruments by insulated wires, sent and received by a crude trans- itter and receiver electrical signals with- t the aid of intervening wires. He soon arned that certain distances could be covered only by having the poles for his boxes of certain height, and the height of the poles had to be increased with the distance. He experimented with the aid of several other scientists for some time, and then the world was startled early in 1899 by the news that messages had been sent by this wireless method across the English Channel from Dover to Boulogne. Little had been known up to that time of the process, but enthusiasm was now expressed everywhere, and when, in October of the same year, the young wizard came across to America to report the great international yacht races between the Columbia and the Shamrock, for the New York papers, and succeeded so admirably that messages were flashed across space when both yachts and sending ship were enveloped by fogs and out of sight of land, it was manifest that another epoch-making discovery had been made.

The method employed by Marconi seems quite simple when it is known.

Hertzian Waves

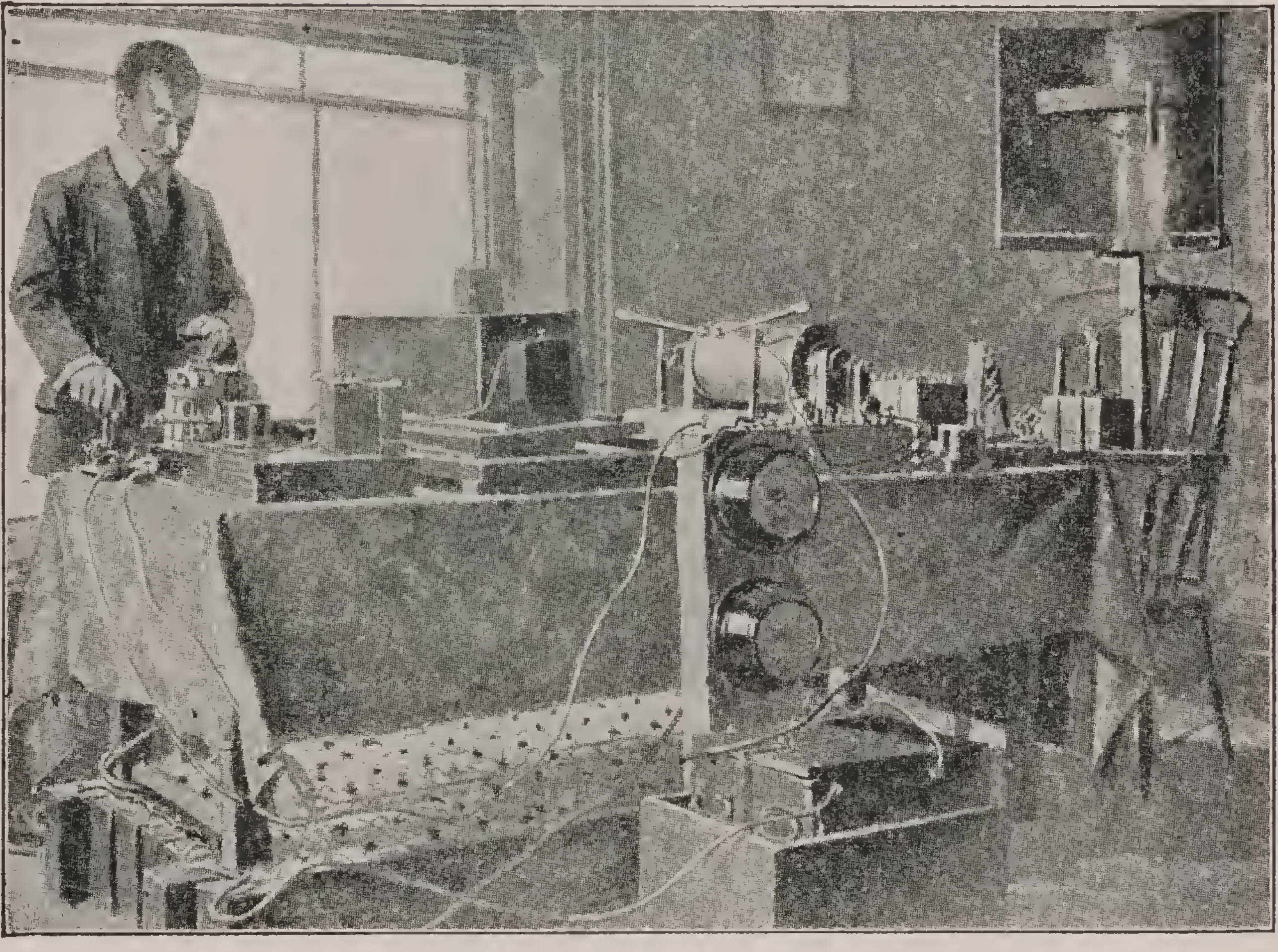
are strange undulations generated by electric impulse that travel through the atmosphere and have the peculiar property of jumping from the Marconi transmitter and fleeing through space at the speed of light, or seven times around the earth in a second. When Marconi understood that these beams could be sent and received by his first crude method, he at once set to work on improvements, and the following system has been the result:



M. GUIGLIELMO MARCONI,
Discoverer and inventor of the Wireless Telegraph.

Two tall poles are erected, one at the sending and one at the receiving stat From these poles are supported sp along each of which runs an ordin copper wire extending vertically from t telegraph instruments into the air. T upper portion of the wire is bare, so th waves of energy may leap off into ce as they are sent up the wire by the ration of the instrument below. This rument is simply a large induction connected with a strong battery. To coil are also attached two brass knobs ne distance apart), from the space be- en which, when the current is on, s a stream of sparks, the same as se produced in experiments with the ay. Now, when a ssage is being sent, transmitting wire charged with a cur- et of electricity at h tension, which nat- lly rushes toward earth. This dis- rge causes a rapid illation in the wire long as the current tinues. This oscil- on must have an let, and, according- leaves the wire for journey across space. is agitation, when it ches the receiving rument, produces an ning and closing of circuit accordingly the waves are con- uous or cut short. use a simple exam- , let us suppose we have a string hang- loose from the ceiling. Now take a and wave the air. The result is the ing is blown back. Make several mo- ns with the fan at short intervals, and string will respond to the air waves. is is similar to what occurs in Marconi's egraphing process. He has a switch nected with the sending instrument, l as he opens or closes this a stream of ctrical sparks follows. It may readily seen, then, that as these sparks impart the waves to the transmitting wire, a short one would send a short wave across to the receiver, and a long stream would produce a long set of waves. That is just what happens.

When this much of the system was perfected, it was necessary to arrange some device whereby the gentle oscillations might be received and interpreted into messages. Here was a hard task, but it was successfully wrought out. In a metal box, that keeps out to a great extent the Hertzian waves, is a relay instrument, two devices called a "coherer" and a "tapper," and a Morse instrument for printing dots and dashes connected to a home battery. The



A WIRELESS TELEGRAPH STATION.

Showing operator in the act of sending a message. The large box on the table near the operator contains receiving instrument; the adjoining cylinder with the two rods ending in knobs is the sender; while in upper right-hand corner is the copper reflector used for directing the waves.

'Coherer"

is the principal and most delicate of all these instruments, and upon its actions depends the success of the sending operation. It consists of a tiny glass tube about as thick as that of a thermometer and two inches long. In either end is a small plug of silver, attached to the aërial wire on the pole outside and to a wire connected with the relay instrument. It must be understood that a wave so delicate in its impulse would not be able to operate a machine of itself; it is only strong enough to give the impulse that will complete the circuit of the home battery, and the latter then works the writing machine.

EXTERIOR VIEW OF A WIRELESS TELEGRAPH STATION.

From the sprit at the top of the mast is suspended the copper reflector which sends the Hertzian waves shooting across space. The wires attached to the mast are only for support in heavy winds.

But how can this impulse be given in dots and dashes of the Morse telegraph code? Simply enough, when one kn
how; and here came in Marconi's gr
est discovery. He learned that nic
and silver were alternately good and
conductors of the Hertzian waves: g
when welded together by a continu
current, but bad when severed into
ticles by a blow from his little ‘‘tappe
Hence, he contrived an arrangement
very tiny particles of nickel and sil
dust,—siftings through silk,—and pla
them between the silver plugs of
‘‘coherer.'' Now, when a wave impel
by a single spark from the transmitte
received by the vertical wire hanging
space from the pole of the receiving s
tion, it comes down through the ‘‘
herer,'' and the tiny particles of nic
and silver cohere (hence the name),
current is imparted to the battery t
sets the Morse instrument to printing a d

To explain more clearly just the uses
the ‘‘coherer'' and the ‘‘tapper,'' we m
remember that the power of the Hertz
wave is very slight; in fact, it could cre
no electrical disturbance were it not
its property of welding together t
nickel and silver filings in the ‘‘coherer
What it can do, however, is to compl
the circuit that will operate the rel
instrument. Let us imagine the circ
of the relay is like an electric door-b
Well, the coherer is in the place of t
push-button. As long as the filings
separate there is no sound, for the circ
is not complete. But let a Hertzian wa
strike the coherer and the filings
welded together, the circuit is complete
and the relay instrument gives the su
cient electrical energy to operate t
writing machine or ticker. But so lo
as the filings in the coherer are in co
sion the instrument will keep up one c
tinuous buzz; hence no intelligible sign
could be sent. Here is where Marc
made use of his

Decoherer or "Tapper."

It is no more than a little hammer tached to an electro-magnet, which, hen operated by electricity, will tap gainst the coherer the same as the tap-er of an electric bell; and this blow ecoheres the filings. Now, when the ertzian wave reaches the receiving sta-on it rushes down to the coherer, the lings are welded together, the circuit is ompleted, and the instrument ticks off s dot. At this instant the relay instru-ent has also sent a current to the elec-o-magnet of the tapper. The magnet raws back the little hammer and lets it rike the coherer, the filings are sepa-ated, and the station is ready to receive he next flash.

Each succession of waves produces he same effect, and the operation is epeated, the result being an intelligi-le series of dots and dashes which re readily translated into their proper neaning.

Messages by wireless telegraphy have lready been sent with accuracy up to 10 miles, of which sixty were over water nd the rest over land. Messages are ot lost by the curvature of the earth, vhich is about 1,000 feet in eighty miles, nd they work all right from a wire 130 eet high. Weather conditions cannot nterfere, nor can the messages be stolen, or the reason that the transmitters and eceivers must be in "tune,"—that is, hey must work in harmony. This makes t almost impossible for the receiver to ake a message not intended for him. The electric waves do not seem to be impeded by buildings or hills in the intervening space, for experiments have shown that messages sent to given destinations, between which and the sender were high hills, buildings, etc., have been accurately received. Whether the Hertzian waves go through or around the intercepting object has not yet been ascertained.

The Principal Cost

of installing a wireless telegraph plant is that of the poles, the receivers costing only about $60. The expense of maintaining the electrical current is nominal. Each station has both a sending and a receiving instrument, one being turned off when the other is in operation. Messages can now be sent at the rate of twenty-five words a minute, so it may readily be seen that when the system is still more perfect, it may threaten the established telegraph lines. Imagine another Eiffel tower on this side of the Atlantic, with sending and receiving stations here and at Paris. The expense of laying and operating the great submarine cables would be entirely done away with.

Already the system is in use on lightships, connecting them with the life-saving stations on shore, and many lives and much property have been saved by its use. What, then, if every ship or train had these instruments? Accidents might be avoided, news imparted without stopping, directions given for war vessels' manœuvres, and countless other similar uses. Marconi thinks some of the greatest improvements in this line are yet to come. He has already devised a sort of reflector that concentrates the waves and shoots them in one direction, like a search-light, so that they may be directed at will, and only to certain spots. He is also working upon an arrangement that will tell from what direction a message comes. He speaks of possibly arranging a set of senders and receivers and so manipulating them for subscribers that

The News of the Day

can be telegraphed all over the country, thus doing away with newspapers.

Modern Wonders of the Electrical World.

RAPID TELEGRAPHY, PICTURES BY WIRE, STIMULATING THE GROWTH OF PLANTS BY ELECTRICITY, ETC.

The marvelous strides taken by American genius in the perfection of new devices and inventions which harness this weird fluid of the air and make it do service in the aid of man.

ASIDE from such marvelous discoveries as the wireless telegraph, the X-rays and the uses to which electricity has been put as a motive power, there are many minor experiments that are daily being made which are rapidly bringing this weird fluid nearer and nearer to our daily life, both for comfort and for money-making. A directory recently published gives the names of 25,464 firms carrying on electrical business throughout the world. The United States, as in most other things, is taking the lead in this important work. Daily we are shipping to Europe and the Orient motors and electrical storage outfits in great numbers.

While in many instances the American trolley system for street cars has proved dangerous, it is, nevertheless, being rapidly taken up in Europe. Electrical plows are being installed on the larger farms, and lighting by electricity is now almost universal. The success of using water power at Niagara and elsewhere for generating this force is remarkable, and the use of the tides about Manhattan Island, upon which New York City is situated, for this purpose has been advanced as tenable

Telegraphing 100,000 Words an Hour.

In telegraphing many improvements have been made, among others being one system whereby the wires are attached t a sort of electrical typewriter, whic upon being operated, sets in motion similar machine at the other end. Th benefit of this system is that the operat does not need to be acquainted with an particular method, any one who is able t spell being competent to work the machine. Another recent invention in thi line is a method of perforating strips o paper with a machine similar to a typewriter, and then placing these strips int the sending device, which transmits th messages at the rate of 100,000 words a hour. This is a marvelous speed, an where the time is saved is that a numbe of men can be set to work at one tim perforating the strips before using th wire for sending. The benefit to b derived from such a system is that ther would be a great saving in laying additional lines, for once the strips are prepared the sending occupies the line but few moments.

Picture Telegraphy.

Sending pictures by wire has at last come so near to perfection that it is being used to some extent in detective work. The method used is called telepantography. By it an engraving or artist's sketch may be sent over almost any distance by common telegraph communication. If a picture is to be transmitted it must first be treated to a process similar to that for a half-tone engraving. A tal plate is made, very thin so that it y be bent round like the cylinder of a onograph. The plate is slipped on the nsmitting machine, and a tiny needle this device traces over all the lines in metal plate, in this way sending im- ssions to a cylinder at the other end of line, about which is wrapped a coil of per. An inked-needle at the receiving d traces the lines as they are tele- phed, and a complete reproduction of original picture is the result. The vice is yet rather crude, but practical ults have been obtained.

Electrical Plant Growth.

The qualities of electricity, though en in the form of lightning and strong ect currents readily take life, are such t in other forms as readily give life. cently experiments have been made on eds, and in one-half the time it takes ture to turn out her work by ordinary ocesses, the application of electricity has ought out mature plants.

The first experiment was made on an g that was being hatched. An electric rrent strong enough to kill a fowl did t destroy the germ of vitality, but the icken when hatched was of most abnor- al size and monstrous in shape. This oved, however, what might be done th this marvelous agent.

In plant stimulation the apparatus con- ts of two glass cylinders, a larger one out two inches in diameter for the ger seeds, and one about three-fourths an inch for those of less size. Within ese receptacles the seeds are placed, oroughly moistened, and the openings osed with copper disks having wires tached. By these wires the disks are nnected with the poles of an induction il, and then the current is passed through the moist seeds, which are good conductors. After this treatment the seeds are placed in germinating pans. These consist of two plates one within the other, the inner being of porous clay. The seeds are sown between two sheets of filter paper, and water passing through the porous plate is absorbed by the paper, thus keeping the seeds moist at all times. The temperature is kept at about 48 degrees all the time by aid of electrical devices, and the growth of the plants is 30 per cent quicker by this method than otherwise, while, at the same time, many seeds not perfect enough to grow under ordinary climatic conditions are saved by this electrical treatment.

Wireless Light.

Nikola Tesla, one of the greatest of electrical wizards, has been at work some time perfecting several devices by means of which he can send wave impulses at great distances through the ether, but in different manner from the Marconi system. He has made the assertion that if Mars is inhabited he can create a great enough current to be felt there. He is also at work on wireless light. But both these inventions are as yet void of commercial value. Some time ago, at an exhibition in Chicago, he conducted a series of experiments in throwing his waves across space and directing miniature war vessels in a tank of water without the aid of connecting wires. Waves were sent across to a receiver, which opened currents that turned switches and set in motion the machinery. It is claimed for these inventions that, when perfected, torpedo boats can be more effectually directed toward the enemy's vessels.

New Studies of the Starry Skies.

ASTRONOMICAL PROBLEMS AND RECENT DISCOVERIES.

THE WORLD'S GREATEST TELESCOPE.

Achievements of the world's greatest star-gazers, and the latest and most delicate devices used by them, giving to the student new facts concerning orbits, seasons, atmospheres, and climatic and general conditions existing on the planets, moons and suns.

PROF. SIMON NEWCOMB, the well-known astronomer, uses a very startling method of comparing the size of the universe, so that we may judge its size by things earthy. Imagine the United States as the extent of the whole known creation, and compare to it a lady's finger-ring as the earth's orbit around the sun. The nearest fixed star would then be about a mile and a half away from the ring, and all the space from the Atlantic to the Mississippi would be studded with other stars, planets and constellations. It has recently been learned that the whole solar system, with the sun, earth and all the other planets, is traveling toward the constellation Lyra at the rate of three hundred millions of miles a year. When we think of this constellation as being about ten miles away from the finger-ring spoken of, we can readily see what enormous distances we are traveling, and little wonder is it that great minds are trying to solve the problem of where and when this vast and furious race began, and where it will end. An astronomer who might watch the heavens for ten thousand years might gain some faint suggestion of the answer to the riddle. But our sun and its system are not the only movi
bodies in the universe.

Thousands Upon Millions

of other stars like our sun are traveling
some direction, and with greater or le
force. A greater question, then, is wh
means the motion of all these oth
bodies, and where will they end? Son
astronomers suggest that each system
shooting off on a curve that thousan
of centuries will complete into orbit
Others say that if the laws of motion l
true for all space and all time, it may l
that each moving star will go on in a
unbending career forever, unless attract
aside by others. In that case, after al
sorbing many smaller stars, a few of th
larger bodies would gradually drift apar
and the inhabitants of each would the
behold only black and starless skies. A
this is amazing in its proportions an
grandeur, but as yet theories only exis
for with millions of bodies flying i
different directions and at such frightfu
speed as 200 miles a second, calculation
are at best but weak.

Another problem that presents itself t
star-gazers is that of the

Size of the Whole Universe.

th the latest improved telescopes we able to see only what is considered a ry small portion of the vast extent of r-filled space. We able at present to unt, by means of pho-graphic telescopes, ne hundred millions these bodies, but it not supposed that we ve reached anywhere ar the edge of the its of their confines. fact, astronomers rdly think they will able ever to know en they have found limit, for even then ere might be a great tervening empty ace, but farther on ssibly another vast ld full of these spark-ng lights. It is said at it is not probable at these stellar sys-ms go on infinitely, r mathematicians ve figured out that if ch were the case, the ght thrown off from ch a number of lumi-ous bodies would light p the whole heavens s brightly as at noon-ay. What the solu-on of this question is ust remain in doubt, seems, forever.

Following close upon his comes the thought,

Whence Comes the Heat

rom the sun and other stars? and where loes it go? We have decided quite accurately that meteors and other falling stars do not start out on their voyage through space on fire, but rather are solid bodies which, when they pass so rapidly through the air, are burned up by the heat of friction. Similarly it is thought that the contraction of the bodies of these stars through the gravitation of their parts

A PHOTOGRAPH OF THE MILKY WAY.

Showing a portion of the myriads of nebulous bodies that make up that great path through the heavens.

creates heat so great that combustion is the result, and when the bodies finally become dense as the earth they grow cold. This theory is pretty well founded upon observations of the sun, and while the conclusion is that this is the proper solution of the problem, yet the process is very slow,—so slow that it would have to go on for thousands of years before astronomers could find by comparing sizes that it had grown any smaller

AN ECLIPSE OF THE SUN.

Caused by the passage of the moon between the sun and the earth.

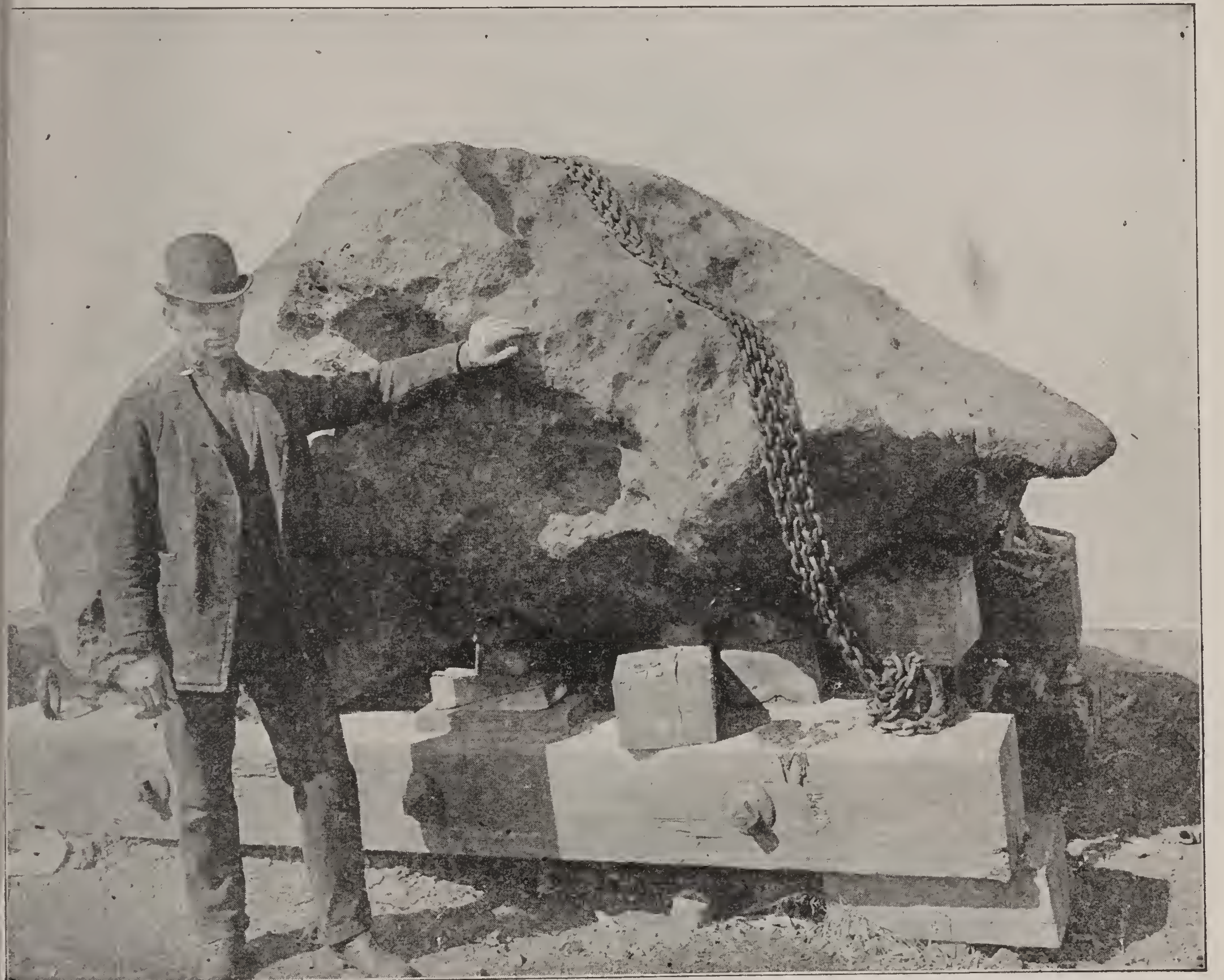
Though this problem is solved to an extent, where does the heat vanish? is altogether a harder question. What becomes of the flood of heat and light that has gone on at the rate of 180,000 miles a second since the dawn of creation? Science of to-day might say that it continues through space forever. But at such a marvelous velocity it seems that in a few thousand years it should have reached the confines of space, if there be any, and there is no reason why it should st there. There is a law of conservation energy that maintains that nothing lost here on earth: no gas that escap but that it returns to nature in some for May it not be true that the heat so lon thrown off from our burning worlds ma return? We cannot say; it remains problem unanswered.

If there are these greater questio relative to the whole universe, there a still as interesting ones regarding th worlds we can behold. The question o whether there are inhabitants on any o the planets is still indeed doubtful. W are not sure yet what bodies have atmos pheres about them such as that whic makes a part of our earth. The moon ha been well studied and with many goo results, though they cannot apply to the planets and stars. We can see that she has no atmosphere and that there are traces of mountains and craters of extinct volcanoes, but the largest telescopes made will hardly ever be able to aid us sufficiently to discern these qualities with accuracy on the farther planets. It is said that Mars is inhabited, that Venus turns on an axis and has an atmosphere, though cloudy and not transparent like ours. Mars was for a long time thought to resemble the earth very closely, but after years of study, the only resemblance thought to be accurate is what is supposed to be a cap of snow that appears to form over one of its poles in the Martian winter.

The Sun.

With the sun there are still many questions about which the astronomers are worrying themselves. We know a great deal about this body, but when it comes down to facts, the study is still full of wonders. We should like to know what is the cause and what the nature of the spots on the sun; why the sun seems so clm when the raging fire that is consuming it is beyond our thought. What is te corona, and has it magnetic properes? And is the hazy patch of light in te sky that follows the counterglow of te sun at its setting in the western horizon the tail of the earth, the same as hat to a comet?

It seems wonderful that the astronomers can map out so well the time of the occurrence for eclipses and showers of meteors and the like, and to the one not versed in the wisdom of the science it seems as though there were but little more to learn, but such is far from the case. All calculations are not exact: the earth does not always perform its rotations in the same time; sometimes it is faster, sometimes a little slower, though very slight. For half a century the moon will jump ahead of her regular rate, and then again she will drop behind.

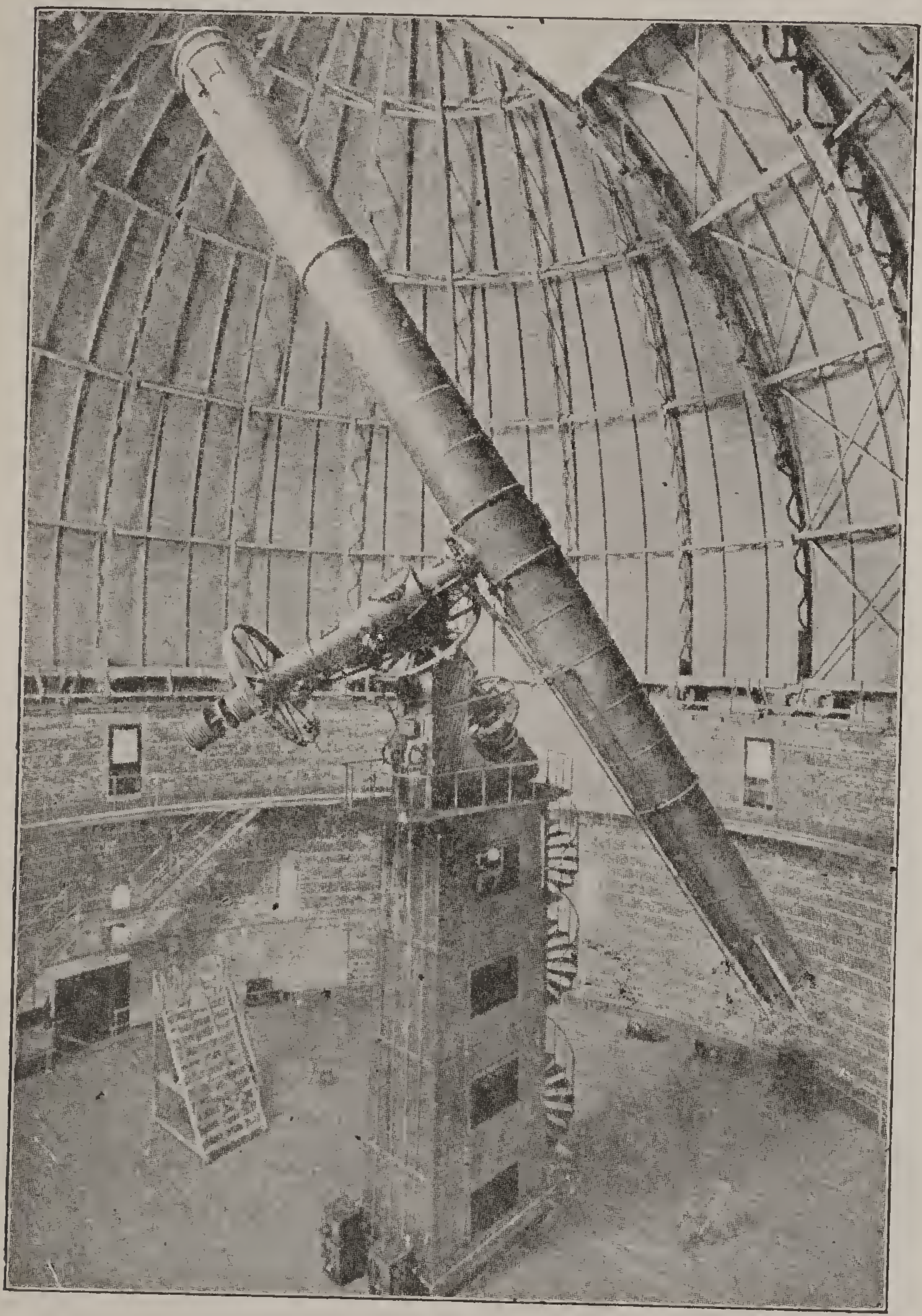


LIEUT. PEARY'S GREAT METEOR "NORTHWARD," THE LARGEST EVER FOUND

Forces Are At Work

here and there that we cannot understand, pulling this planet toward another and vice versa. In all it is a science the most exact and beautiful, but far from finished.

Recent photographs of the moon, taken by means of the elbow telescope at the Paris observatory, have led scientists to believe that the moon has still about it the remains of what was once an atmosphere. Faint traces of this can be found, and when the shape of the moon shows such a similarity to the earth in the formation of its mountains and craters, ocean-beds and streams of lava, it is thought by some that very likely the same conditions once existed there as do at present upon the earth: hence that the moon was once inhabited. Among th recent discoveries in astronomy the nov assertion is made by Professor See th the color of a star varies with its ag being yellow in its youth, and its old age blue, the tint being matter of temperature. The blue it becomes the hotter it is, because great heat causes blue ligh waves. Thus, Sirius is a ver blue star, and gives out about on hundred times as much heat a the sun, though only perhaps fou times as big. When the sun becomes hotter with age, it is argued it will be bluer, and we shall hav blue instead of nearly white light



YERKES' TELESCOPE: THE LARGEST AND MOST POWERFUL INSTRUMENT IN THE WORLD.

(Tube sixty-five feet long; lens forty inches wide.)

Interior view of Yerkes Observatory, showing the great "lifting-floor" at its lowest point. By means of electric motors this floor can be brought up even with the eye-piece of the instrument; electric motors also turn the tube and the observatory dome in any desired direction.

The Largest Known Meteor.

Lieutenant Peary, the great arctic explorer, in tramping through Greenland recently found the largest known meteor, which, in honor of his voyage north, he called the "Northward." It contains much iron, and from this substance the native Esquimaux made many knives and fishing implements. It is many times as large as a man, and weighs one hundred tons.

Yerkes' Great Telescope.

With all the studies that are being conducted in astronomy, let us look at a monster telescope by means of which we are brought nearer the starry skies. Charles T. Yerkes, the street-railway king of Chicago and New York, recently gave to the University of Chicago the newest of the great telescopes. In its observatory on the shores of Lake Geneva, near Williams Bay, Wis., it gives to students the opportunity of making the best examinations of the stellar ems possible. The huge forty-inch of the great refractor is the largest in stence, and it probably marks the limit size to be attained in the manufacture the instruments, because any larger might not give so distinct visions, ides being of such great weight that large steel tube which holds the sev- rl lenses would very likely sag and not accurately steady. The large glasses he lenses of this telescope were ground Alvan Clark, who came from a family ens makers. The glass proper is com- ed of two lenses, one of crown glass, other of flint glass, ranging in thick- s from three-quarters of an inch to inches, and placed eight inches rt. They weigh 500 pounds, and re four years in polishing, the final ches being done by the maker's finger- s. Contrary to common thought, dust es not hinder in the use of the tele- pe, and no protection from it is placed r the glass. Even a small scratch uld not greatly hurt the glass, though course this is avoided with as much e as possible.

The length of the great tube is sixty- e feet, its weight twenty tons, yet the ole instrument is so evenly poised that can with ease be moved to any angle or sition by the hand. Under the ninety- ot dome, where this monster eye is used, is a large lifting floor of forty tons ight, that can be brought, by means electric motors, up to a height even th the eye-piece of the telescope. The eat dome is also movable, being placed car wheels which rest on a circular ck, and at the will of the operator the ole affair may be revolved about so at the large opening in the roof may be ought opposite any star. The motive wer for the dome is electricity, as it so is for the great sliding shutters for e roof of the dome. Inside the base of the tube is a clock-like arrangement that adjusts various parts of its workings, as well as keeps it moving steadily in the path of the star being studied. The total cost of the huge glass and observatory was a half million dollars, but the outlay produced the most perfect seeing apparatus yet devised by man.

A peculiar incident about the history of the glass is that after Alvan Clark, the maker, had superintended the setting of the lens, he returned to his home in Massachusetts and died the next day.

With this instrument many interesting facts are being learned. It has been learned that a layer of carbon, hitherto unknown, surrounds the sun; the fifth satellite of Jupiter, discovered with the Lick telescope, has now been measured by means of the small spider webs drawn across the eye-piece of this new glass. It has also been ascertained that the earth receives a small amount of heat from the stars. Excellent photographs of the moon have been made, and at frequent intervals scientists assemble there from all over the world to make special observations.

Arrangements for photographing with this gigantic camera are numerous. One of the oddest to the uninitiated is that of a set of lenses attached to the outside of the great tube and about forty feet apart. It is naturally supposed that light must be shut off from between the glasses, but such is not the case this time, for all that is wished to be photographed is the object that appears at the focussing point on the eye-piece. Therefore, the only place the light shutter is used is at the end nearest the sky.

A word might be well about the dainty little spider webs used in making measurements with such a telescope. Spiders are kept for the purpose, and in little boxes arranged like lantern slides the webs are strung before the eye-piece, so that when a star is brought into view a delicate shadow is thrown across its image by these film-like threads. Knowing the space between the meshes of the webs and the distance of the stars, their sizes are computed. These webs are used in preference to any threads that might be manufactured, because of their extremely delicate nature. Another arrangement of interest is a series of colored lights may be thrown on these webs for t what the stars are made of. It is known that certain minerals burn w certain color, so that by turning given light, the light that still show from the star can readily be classified the make-up of the body under obse tion easily decided.

A MARVELOUS SHOWER OF METEORS

The Great Canals of the World.

PANAMA, NICARAGUA, KEIL, CHICAGO DRAINAGE.

Artificial waterways that will save millions of dollars and make it possible for gigantic ocean vessels to make direct voyages to inland cities and towns which have heretofore been beyond the limits of navigation.

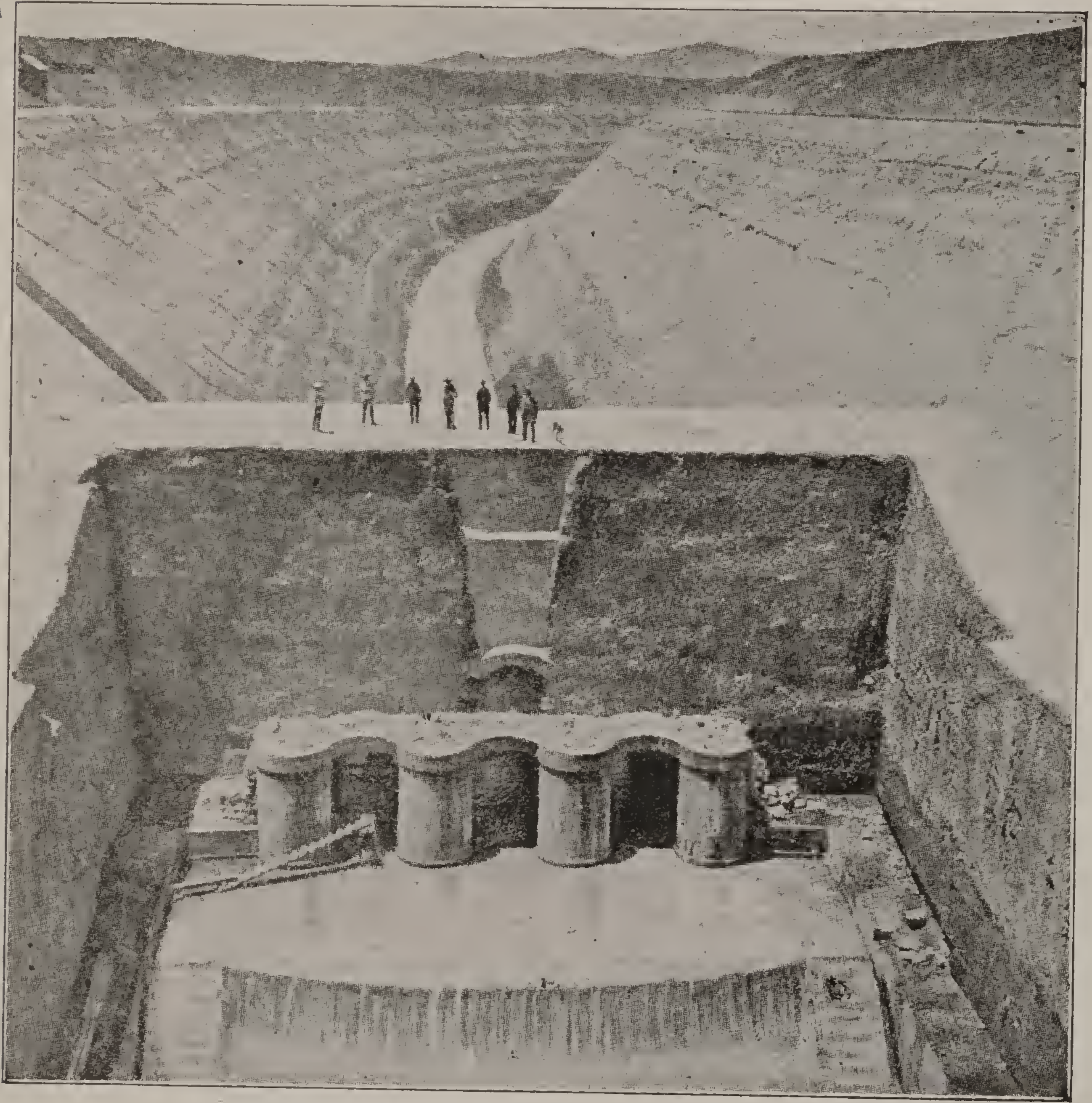
FOR nearly a century after the discovery of America, explorations were made to find the straits that were supposed to t between the northern and southern ves of the continent. At last, when Isthmus of Panama was found, en- eers at once began to dream of an ficial waterway to link the Atlantic Pacific oceans. The canal routes have received the most publicity are se of Panama and Nicaragua. Both these are under way, though the ama has expended the more money is nearer completion. The United tes government has .interested itself he Nicaragua plan, and has authorized expenditure of $115,000,000 on that te.

The Panama Route

lready cut two-fifths of the way across Isthmus from Colon on the Atlantic to Panama on the Pacific, and the of completing it will be about $102,- ,000. The route at first lay over nty-five miles of river, eight miles of Cordilleras mountains that had to be down from 100 to 325 feet, and a at part in bottom lands. Great floods he Chagres River and the opening up he damp soil causing sickness necessitated the change of route. Estimates now show $87,000,000 to be necessary for completion, and eight or ten years' time in which to do the work. The route as now laid out is forty-six miles long with the same ports as before, only the Chagres River is not used and in its place canals are to be dug. From Colon fifteen miles is straight cut canal; after that comes a dam which by controlling the waters of the Chagres will flood the country for 13½ miles, with an artificial lake. This lake is to be used as a channel of the canal, and at the other end follows a section of canal five miles long which is the highest of the whole route, sixty-eight feet above the sea. Six locks altogether control the water between the sections, while another artificial lake nine miles north of the main route, caused by another dam, will supply water in dry season.

The Nicaragua Canal,

while well indorsed, is a great deal more difficult task than the Panama, and but a small part of the work has been done. It is to extend from Greytown on the Atlantic, to Brito on the Pacific, using as main channels Lake Nicaragua and the San Juan River. Six locks control the water, and the hardest part of the plan is to build a series of dams, some of them 6,000 feet long, to check the flow of the San Juan River so that the whole valley will be flooded and make an immense artificial stream connecting with the lake. Short and steep canals are built at each end of the route and connect the lake and river with the oceans. The route is 169 miles long as compared to forty-six on the Panama, while the summit level, or highest point, is 154 miles long, with one end but thirteen miles and the other two miles from the oceans. Should a break occur in one of the Nicaragua locks, half this stretch would be emptied of water and the vessels in transport w be stranded. With both these r in construction a waterway across Isthmus is assured before 1910.



OUTLET OF A MODERN CANAL LOCK.

Here is controlled and put to use the enormous power developed by the flow of these great artificial streams.

The Keil Ship Canal.

The great ship canal which is tined to connect the Baltic with Black Sea, work which was begur 1898 by the Rus government, is b pushed forward the greatest zeal an the same time wit quietness amount almost to secre When finished, work, on account of immensity and the most insuperable c culties to be overco will be worthy o place beside such m ern wonders as the Gothard Tunnel and Suez Canal.

The route unites River Dnieper, wh flows into the Bl Sea, with the Dw which empties into Baltic Sea at Riga. starts at Riga, foll ing the course of Duna River as far Duneberg, where i united to the Beres by means of an immense course cut ri through the country. The Beresina a the Dnieper are then used to compl the connection. The total length of line is 1,600 kilometers, or about 1, English miles, 200 kilometers of the tire distance being artificially cut thro the land. The work is to be finished e years, if all goes well and a sufficient mber of men are kept at work during t period.

he canal is about 307 feet wide, and ut thirty feet deep, thus allowing the gest vessels means of passing from sea to the other. Seventeen large ts, or artificial bays, are to be con- ucted along the line as well, each able of containing a large number of ps, so that a Russian vessel, however ge it may be, may make the entire nsit in six days without hindrance of kind.

The Cost

the work, at the lowest estimate, and ing into consideration the means at disposal of the Russian government to the adoption of unpaid labor, will ount to about $120,000,000. The le passage is kept within the limits of Russian Empire, thus allowing Rus- absolute sovereignty over the entire rse. Putting aside the great political antages given to Russia by the new erprise, the gain commercially and mically will be an incalculable one.

Chicago Drainage Canal.

ne of the greatest enterprises in the of canal building has just been fin- d by the Sanitary District of Chicago, consists of an artificial waterway con- ting the waters of the Chicago River those of the Mississippi. For years filth of the Chicago River has been as to give the stream the name of wer." The refuse from numerous ories emptied into it, and in heavy ther or after a thaw these waters ed far out into Lake Michigan, from ch Chicago gets its water supply, thus being a great menace to the health of the inhabitants. The opening of this canal effectually turned back the waters of the river from its mouth and made the stream flow towards its source. Virtually Lake Michigan thus has an outlet to the Gulf of Mexico, the water flowing steadily up the river and out through the cut that joins the river at its south branch, and over a rocky bed and between stone walls to Lockport, Illinois, where a great controlling dam is situated that lets the water into the Des Plaines River. From this point the water runs by way of the Des Plaines, through the town of Joliet, to the Illinois River, and thence into the Mississippi. The canal is 160 feet wide, is made of six-foot thick masonry, and is deep enough to admit ocean vessels, while it has a capacity of 600,000 cubic feet of water a minute. Part of the route lay along clay beds, and here the work of construction was the easiest; elsewhere it lay along solid rock, and here blasting had to be done; another part lay along a prairie, and there a wall of stone thirteen miles long had to be built.

To remedy the sewage problem of Chicago the whole sewer system had to be reversed, and the refuse matter made to flow out to the canal instead of into the lake as heretofore. To do this large intercepting sewers were constructed underground, connecting the larger sewer mains and emptying into the south branch of the river. It took seven years to construct the canal, and about $32,000,000 were expended. The money for this was raised by taxes, but a large income will be derived from the use of the power developed by the fall of the water over the dam at the big controlling works at Lockport.

The Stupendous Power of Niagara Falls.

FIFTY THOUSAND HORSE POWER DEVELOPED FROM THE WORLD'S GREATEST CATARACT.

THE Niagara Falls are now being used to operate great electric dynamos for generating power for many factories in their neighborhood. The waters of lakes Superior, Michigan, Huron and Erie empty into the Niagara River, which after leaving Lake Erie flows swiftly for two miles and then widens and separates above Grand Island into two branches. These come together again below the island, and flow slowly about several islands till their combined waters reach the "rapids" about a mile above the falls. The flow of water here is 275,000 cubic feet a second, or half a million tons per minute. This enormous flood was first utilized for power in 1725, when a small saw-mill was erected near the falls and run by its force.

The Niagara Falls Power Company recently made cuts in the river a mile above the American Falls. Water is led in from the "rapids" by a canal 12 feet wide and 180 feet long, with capacity of 100,000 horse power, to a wheel pit 30 feet wide by 200 feet long and 180 feet deep. Eight steel penstocks restrain the water in its plunge down to the bottom of the wheel pit, and at the base of each is a 5,500-horse power vertical turbine. The shaft of each turbine is attached at the upper end to a 5,000-horse power generator, which gives the plant a total capacity of

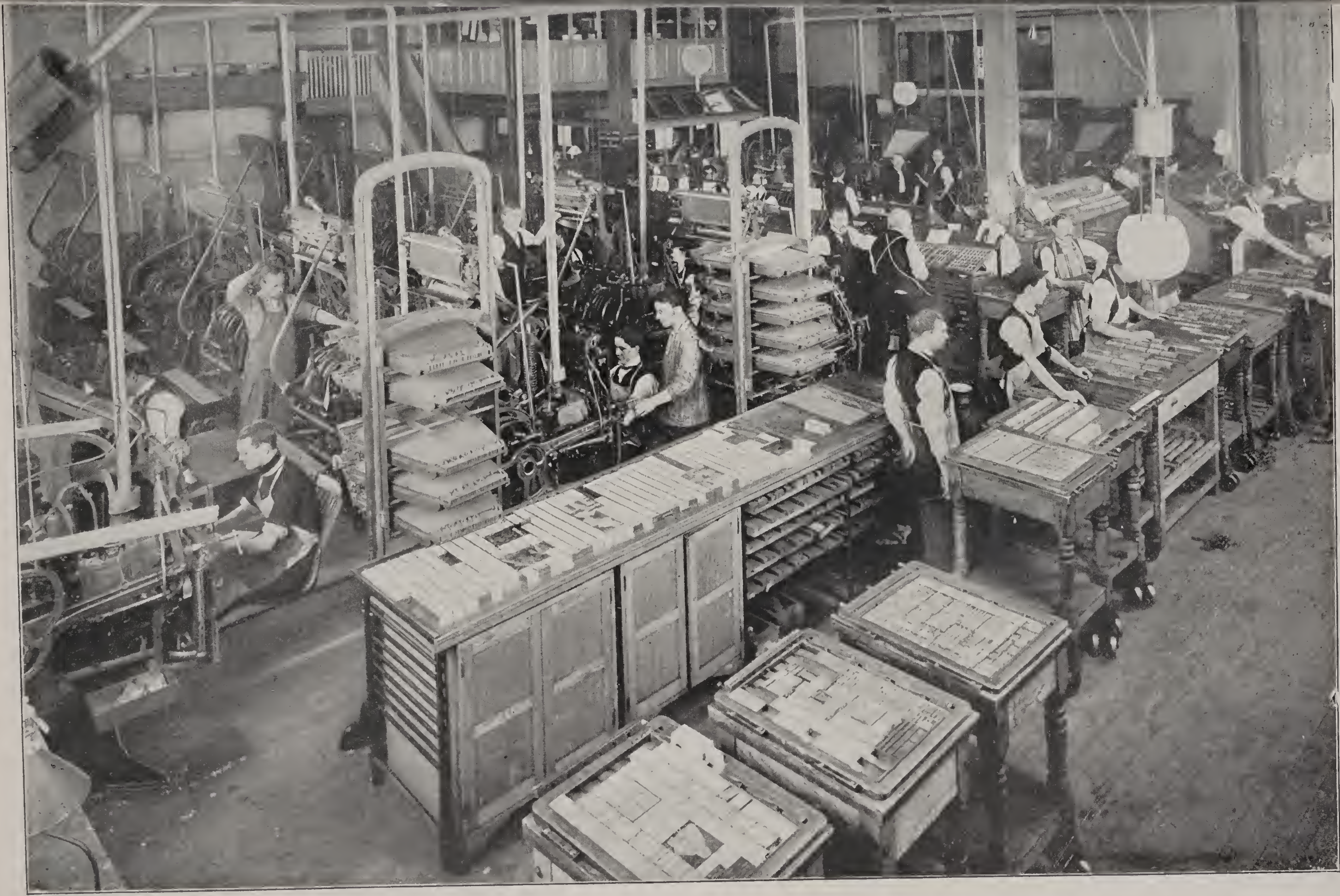
40,000 Horse Power.

Provision has been made for two m
turbines and for another house to be bu
on the Canadian side. From the wh
pit the water runs through a tail-r
7,000 feet long directly under the town
Niagara Falls to an outlet at the base
the cliffs.

The Niagara Falls Paper Company u
7,200 hydraulic horse power from t
same point, taking it from the canal
fore it reaches the penstock.

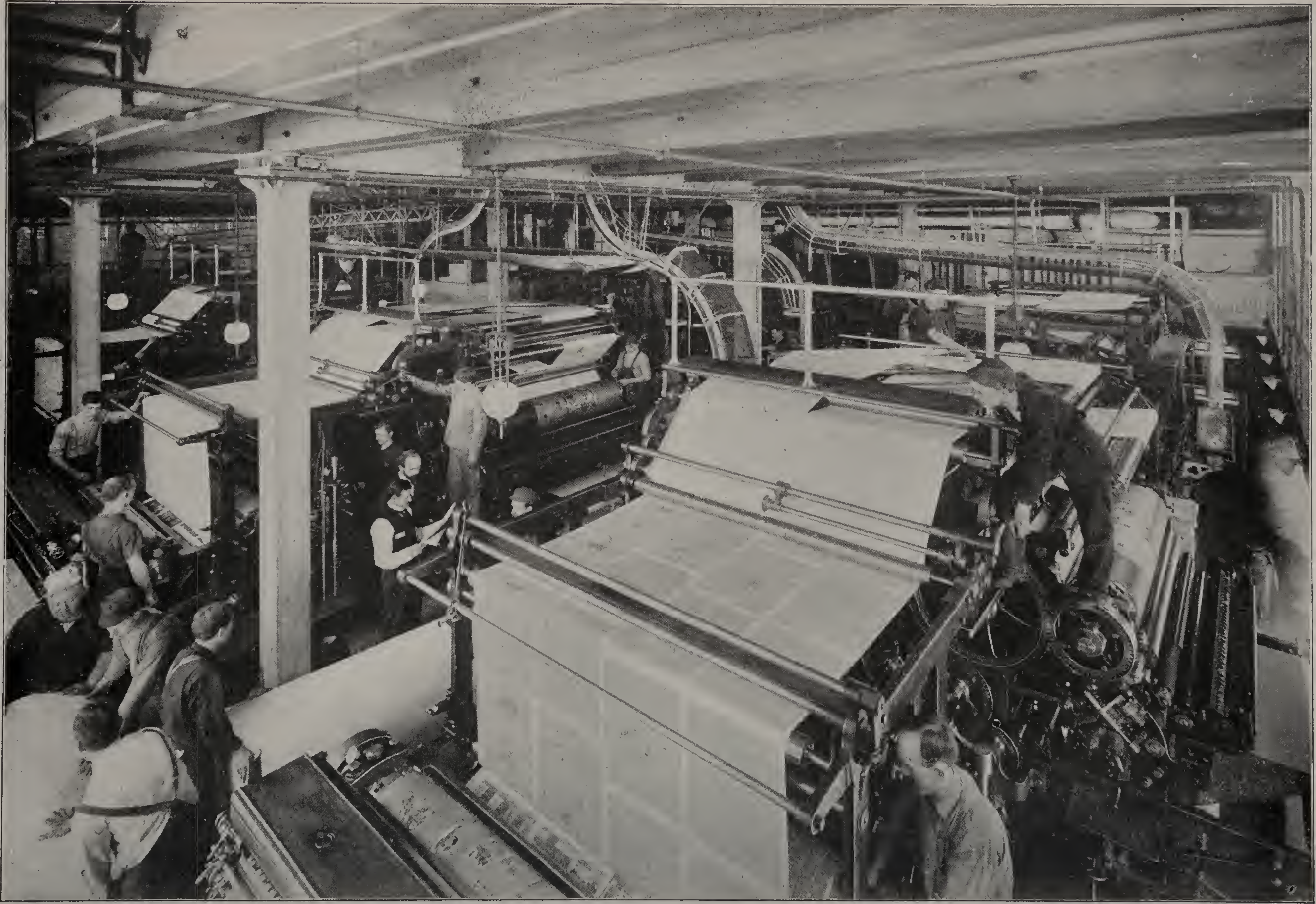
Another plant, operated by the Niag
Falls Hydraulic Power Company, takes
water from the rapids 2,000 feet below t
other intake, and runs a canal through t
town to the edge of the gorge, where t
penstocks, eight and eleven feet
diameter, take the water to a pow
house 200 feet below at the edge of
river. Here horizontal turbines deve
energy to about 20,000 horse power.
old canal built in 1858 also supplies ab
7,500 horse power. On the Canadi
side the Niagara Falls Park and Ri
Railway operates a power house wi
two turbines, and generates 2,000 ho
power.

The theoretical power that is possi
from the Falls is that of 7,500,000 hors
of which, however, less than 50,000
being developed and put to use
account.



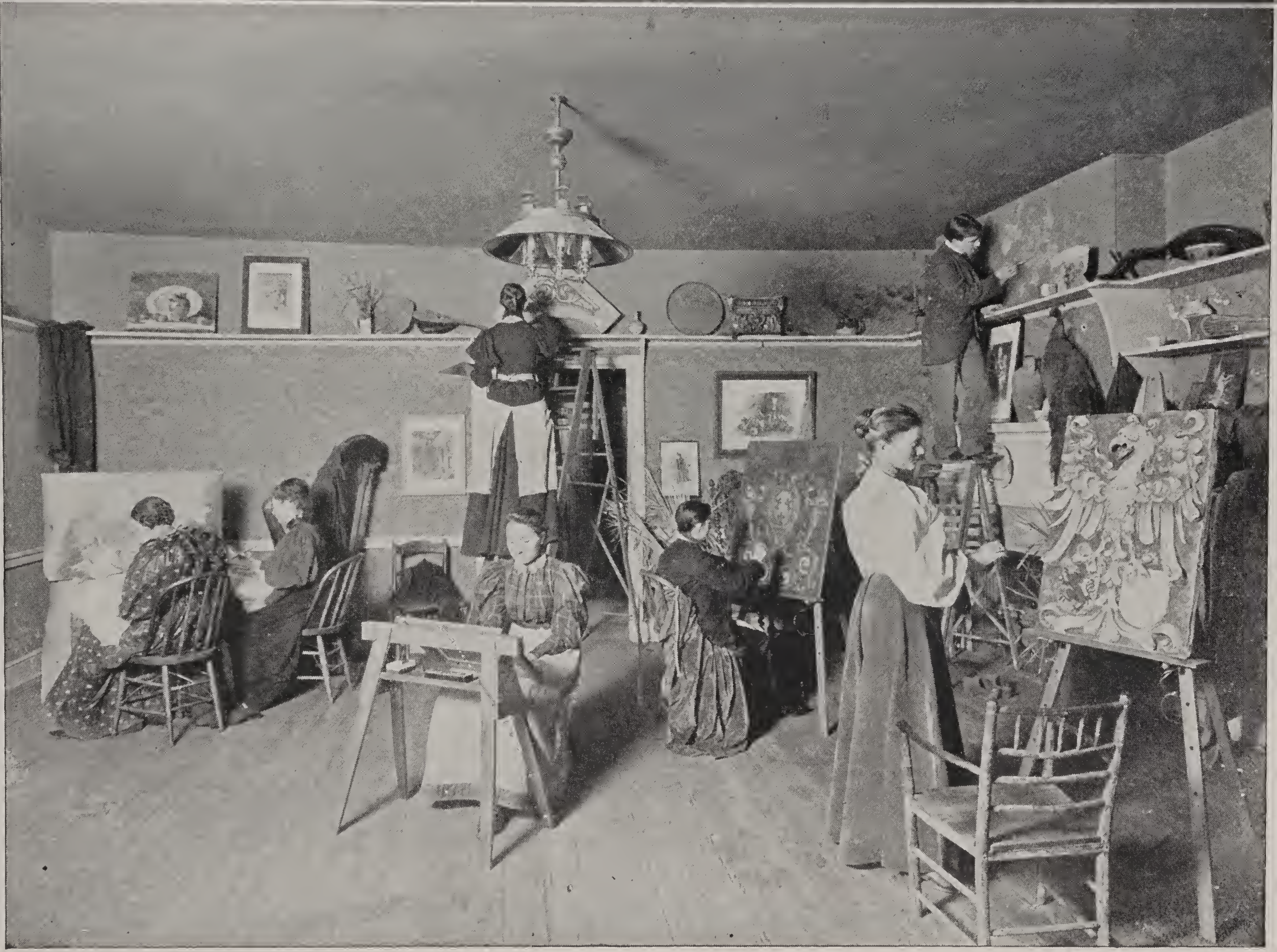
THE LINOTYPE AND "MAKEUP-ROOM" OF A GREAT DAILY NEWSPAPER

IN THE BACKGROUND ARE SEEN THE LINOTYPE OR TYPESETTING MACHINES AND THEIR OPERATORS. IN THE FOREGROUND TO THE RIGHT ARE THE TYPESET PAGES OR "FORMS" OF THE PAPER

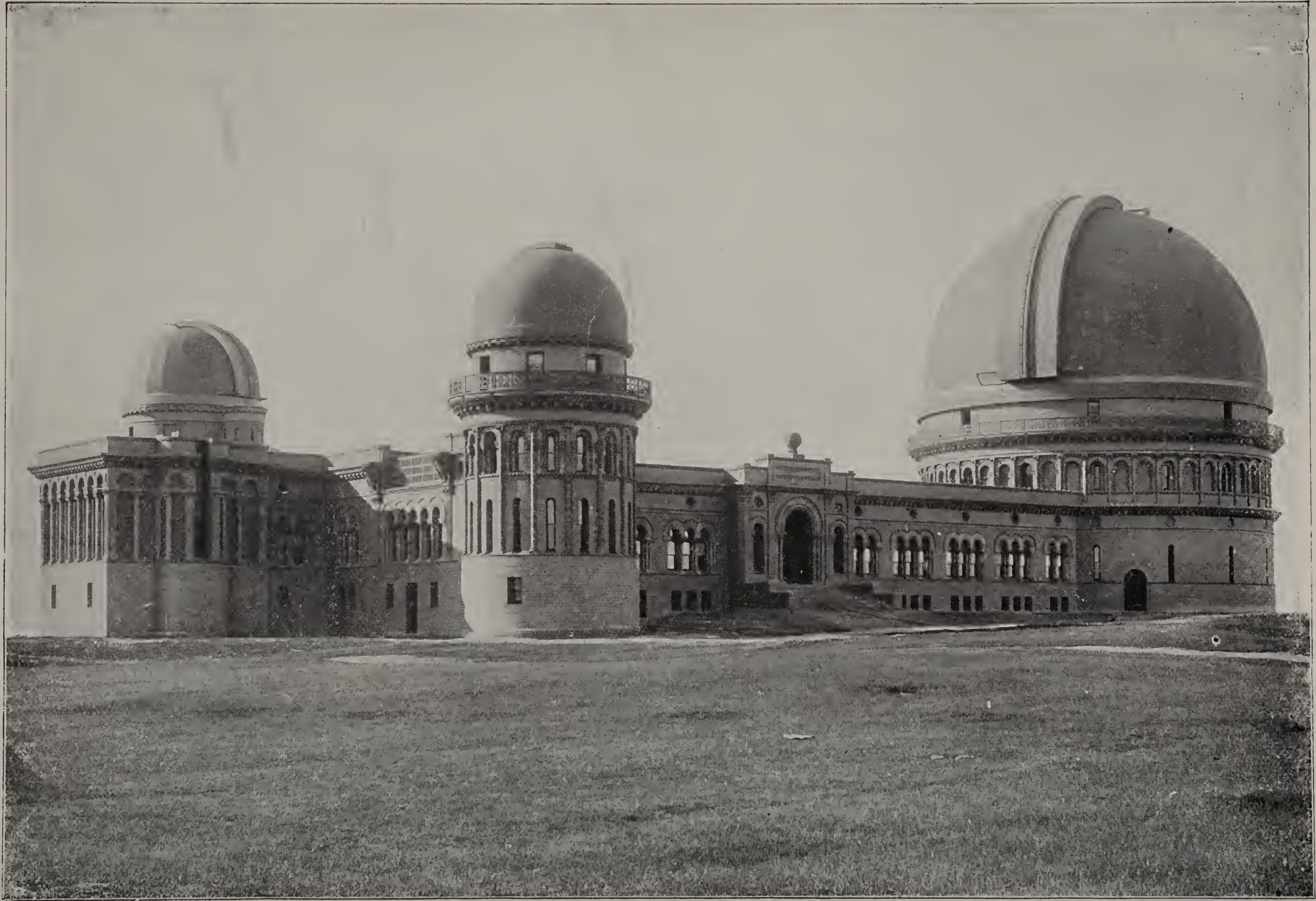


THE HOE QUADRUPLE PRESSES IN THE PRINTING OFFICE OF A LARGE DAILY NEWSPAPER

TO THE LEFT ARE HUGE ROLLS OF PAPER READY FOR USE. IN THE CENTRE-FOREGROUND IS SEEN A PRINTED PAPER COMING FROM THE PRESS, FROM EACH PRESS CURVING UPWARD THROUGH THE CEILING, ARE TROLLEYS FILLED WITH PAPERS READY FOR DISTRIBUTION



STUDENTS OF DECORATIVE PAINTING AT WORK---SCHOOL OF INDUSTRIAL ART, PHILADELPHIA.



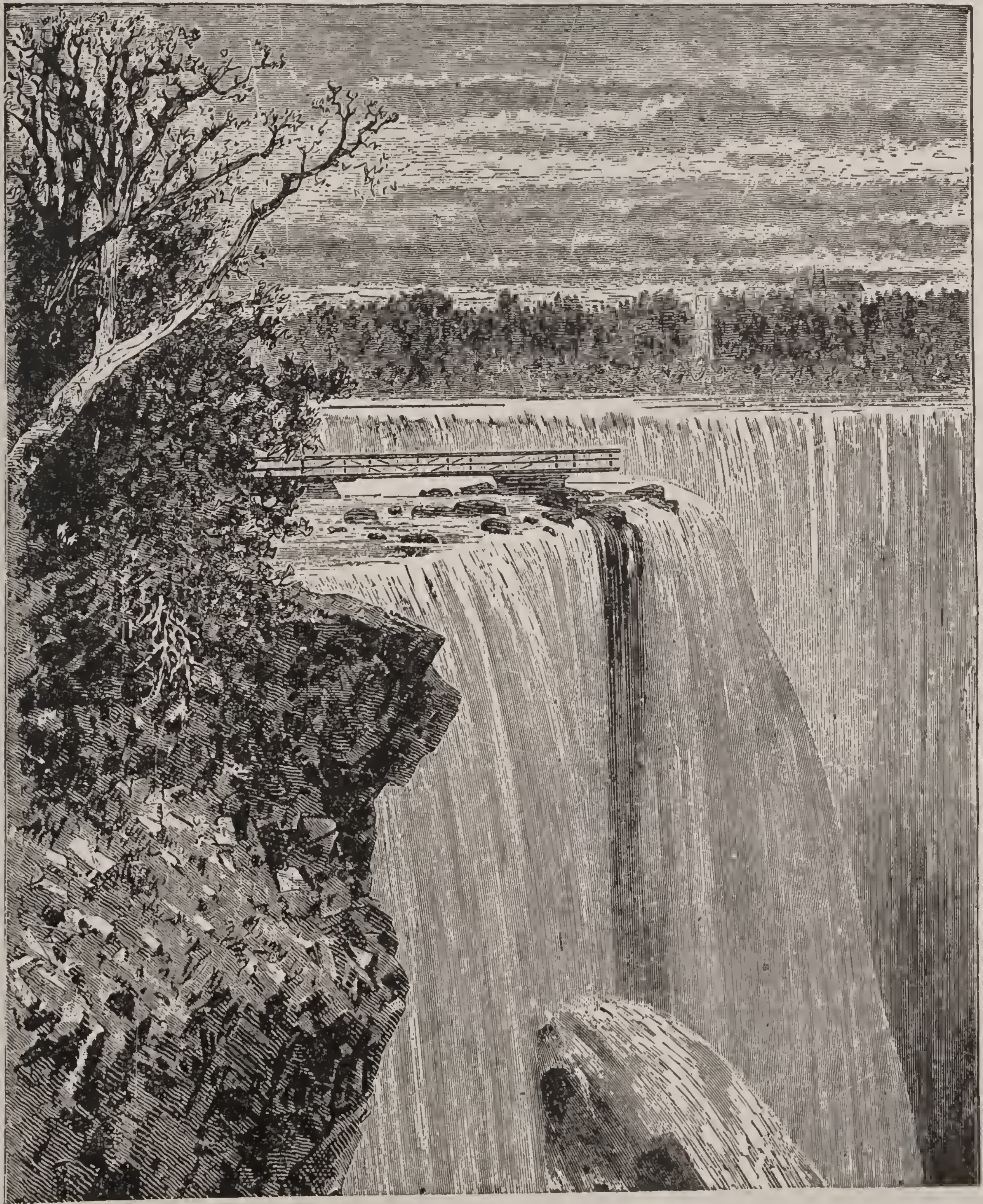
THE YERKES OBSERVATORY ON THE BLUFFS NEAR LAKE GENEVA, WIS.

IT IS CONNECTED WITH THE ASTRONOMICAL DEPARTMENT OF THE CHICAGO UNIVERSITY, AND CONTAINS ONE OF THE GREATEST TELESCOPES IN THE WORLD,

The Turbines

t do the work of generating power are ranged in pairs. Each is attached to a -foot diameter inlet tube. Two large volving bronze wheels receive the ter, which has first been governed by essure gates, and led into the wheels draught tubes, which are so arranged to keep the dampness out of the machinery. The turbines are 70 inches in ameter, and have 36 blades, each one of 2 square inches and highly polished so not to give resistance to the water. e axis of each of the great wheels is ½ inches in diameter, and they are all mounted on ball bearings. Each turbine revolves 250 times a minute.

Industries using electric power for manufacturing paper, aluminum, carborundum, calcium carbide, and other chemical industries, street railways of Niagara and a railway of twenty-two miles to Buffalo, are all being operated by this great power generator. Buffalo alone takes 6,000 horse power. It was at first thought that the electricity thus generated would sometime be taken great distances for power purposes, but the tendency is more for industries to move near Niagara than to transmit the power.



THE WORLD-RENOWNED NIAGARA FALLS

The Cinematograph—Moving Pictures.

Reproducing, by means of the camera, the motion of moving objects as well as the objects themselves. A wonderful accomplishment which science in the time of our fathers would have scoffed at as impossible,—to-day an absolute fact.

TO THE person viewing for the first time the flitting pictures projected from a moving-picture machine to the large magic-lantern screen where they reproduce accurately every phase of life in rapid motion, there is something very weird and fascinating. When one knows, however, the means by which this extremely odd and interesting feat is accomplished, he simply learns that another great improvement has come about in this age of invention.

The first phase of the moving-picture study was that of the invention of the

"Zeotrope."

This was a toy in the shape of a wheel-like disk. On the back were painted a number of figures, each one in a stage of motion a little farther advanced than the one before it. Under each picture was a narrow slit, so that when a pin was run through the center of the disk and the picture side of the zeotrope held nearest a mirror, the person using the toy might squint through the slits as they passed by when the disk was whirled around. The general effect thus seen through the slits reflected on the glass was that of the object going forward by jumps, a great deal like real life. Since the artist h to draw upon his imagination in painti the pictures, they were often incorrect attitude, therefore as the disk spun arou some very grotesque methods of locom tion were the result.

This, however, was but the start of series of experiments which later broug to perfection the present motion picture Some years later there appeared an inve tion which brought to light the main pri ciple now used in the best machine namely, the passing of a strip of pictur behind the lens of a lantern, the devi having a shutter which cut off the lig for a short interval, as a new picture w moving into place, and again opened allow the passage of light as the pictu paused an instant before the lens. A experiments have since been conducte upon this system of jerking picture through on strips, letting them paus for a moment before the light, then shu ting off the light and then again goin through the same operation.

The question now came as to how co rect pictures might be obtained to plac on these strips. When instantaneou photography became a fact, a man name Muybridge, of California, tried the schem of placing a number of cameras in a ro g a road where he trotted a horse, as the horse was in front of each era the respective shutters were set automatically. The result was his ous "Trotting Horse," which for e time astonished the public in its ike motions. But it is apparent that cameras had to be placed so far apart the jump from one picture to the t was too great, especially if the ma- ne reproducing the pictures was moved y rapidly.

The Kinetoscope.

hen came Edison with his famous etoscope, by which he took series of tographs on long strips of film at the e of some thirty a second. After this cess the rest of the work of perfection s simply that of mechanical contriv- es, the principle remaining the same. he systems in all the different motion- ture machines are very similar, though re are nearly as many names as ma- nes. First, photographic films are pared on strips of gelatine, varying in gth from seventy feet to six hundred t. These strips are sensitized the ne as a photographic plate, and are und in convenient spools. The object to pass this strip of film through a nera at the point where the plate is ally placed, or the focal point, unwind roll bit by bit, have a tiny section an h long stop still in front of the lens of camera for a short fraction of a ond, then have a shutter cut off the ht, and the roll proceed till the next h is before the lens. When the light on again, another exposure is made, d so on till the whole strip of film is ed up and about a thousand pictures ve been made, all in the space of a le over a minute. This process re- ires a delicate mechanism, for the film st stop before the lens just during that ction of a second that the shutter is open, and the shutter must remain closed while the next bit of film is moving into place.

After a series of pictures have been exposed, the strip of film is taken to the dark-room and developed. To handle a roll of flimsy gelatine seventy, a hundred, or perhaps several hundred feet in length is no small task, but devices have been arranged for keeping it on a windlass and unwinding and developing a short length at a time, or winding it on frames with pegs on them, so that the whole piece can be developed at one time. After the film is dried another film is placed over it and another exposure is made, only this one is a positive, whereas the other was a negative,—that is, in the negative all the white objects were black, and the black objects white, but in the positive they are their proper colors. Now, after the positive has been dried, it is ready to be passed again through the machine, which is, however, this time fitted with a powerful light of some kind, similar to that in a magic lantern. The film is unwound and the shadow is cast by the light through the lens upon the white screen; then the shutter cuts off the light, the next picture moves into place, and the light throws another picture. The pictures move about fifteen to the second, that is, almost the same as the animal moves in real life. By a peculiar phenomenon, called "persistence of vision," we retain upon the retina of the eye the image of what we have seen for even a short fraction of a second after we have shut our eyes, or the light has been cut off. This may be explained by looking through the flywheel of some large engine. The spokes keep cutting off the vision, yet the only result is a haze over the object beyond. Well, this is what enables us to view these motion pictures, for as we gaze at one picture it becomes firmly impressed upon the retina of the eye, and stays there long enough for the next picture to be moved into place. Thus we experience the effect of a continuous motion instead of a series of pictures, though there is a jerky sensation that it will take some time before the inventors can do away with.

Pictures may be colored and made more lifelike, though this is not often done. As yet these motion pictures have not been placed to much use beyond th amusement. It is helping in s studies, however, such as that of anato Pictures of operations may be made afterwards shown to the class. At p ent we have all sorts of subjects, f athletic contests to naval and land tles; from scenes in the nursery to flight of birds or the thundering adva of the fast locomotive.

The White Man's Greed for the Land of the Blacks.

CIVILIZATION IN AFRICA.

THE scramble for land in Africa by the nations of Europe is of comparatively recent date. Earliest explorations were begun in 1553, and while the continent has held more of romance and danger for the explorer than possibly any other, it has been a hard task to colonize it. France and England, as in other things, have been constant rivals here, with England in the lead. Country after country has pushed into the interior at different points along the coast, and gained control of the native chiefs. Generally the partition went on gradually and peacefully, and it was not till after the Brussels Conference in 1878 that the unrestrained scramble began that has since resulted in the division of the whole continent among the great powers. In 1876, while Great Britain, France, Spain and Portugal had located colonies on the coast, the interior was largely held by wild tribes, but since then the work of division has been so energetic, that in 1890, of the 11,900, square miles of territory on the contine only some 1,500,000 remained open further conquest. Conflicting clai have existed all along between powers, and it was through these mai that France had trouble with England Fashoda, in which the latter country ca out victorious, and which keeps Englan army in the Soudan. The recent troul with the Boers in South Africa will v likely add to the possessions of Gr Britain, while France is daily getting stronger hold on Madagascar. The follo ing is the area as controlled by the differe powers, omitting such as has over it or a protectorate government: Great Britai 2,250,000 square miles; France, 3,50 000; Germany, 890,000; Portugal, 900,00 Italy, 600,000; and Spain, 250,000. Besid these possessions there, the Congo Fr State controls 850,000 square miles; L beria, 37,000; the Boer republics, 162,64 and unappropriated territory, 1,500,000.

Scientific Farming.

FOREST WASTE: IRRIGATION: PREVENTION OF FROSTS:

Congress investigating and assisting in agricultural expansion, making it possible to grow grains and fruits in what was formerly a barren waste.

YEAR by year the United States government is striving to aid the farmer and land-owner by scientific work through the Agricultural Department. One of the greatest problems before the department, and before the whole country in fact, is the waste of timber, the denudation of forest land and the resulting floods that ravish the countryside in the spring, only to be followed by long droughts in the hot season. The making of paper is of course a necessity, but the rate at which timber cutting is going on for building and for making paper pulp is astounding. The people of Maine have complained, but they are not the only ones who are becoming anxious over the depletion of our great forest lands. The devastation is enormous, and the waste is equal almost to the amount used. A substitute is desired for paper pulp, and the Legislatures are taking up the question. Cornstalks have been used with some success, and some relief seems in sight.

Congress, in the fall of 1899, sent a

Commission to the Head-Waters of the Mississippi

which looked over the ground in Minnesota for the purpose of establishing a national forest reserve and game park. The possibility that the vast cuttings of timber at the head of these waters might threaten this mighty stream has caused this action of Congress. The forests keep the moisture under their roots and allow it gradually to seep through continuously in all seasons. When trees are cut down it leaves a barren tract of land, over which in rainy seasons the waters pour in gullies to the rivers. Disastrous floods follow, but as soon as the rain ceases, as harmful droughts take their place.

While forestry has become a living issue in the fertile Atlantic and Northern States through the depletion of perennially flowing springs and streams and increased flood action, and probably by greater and increasingly injurious extremes of frost and heat arising from forest destruction, in the West and Southwest successful forestry is to be the saving of the country. Vast stretches of arid land await development, and what good timber land there is will be saved at all hazards. The covering of the mountain sides must be respected, though of course old trees may be cut as young ones grow up.

Another method for

Reclaiming the Bad Lands

is to find crops that will grow in arid soil. Brome grass and broom-corn millet are being tried with great success. This possibly is an easier way for the individual farmer than irrigation ditches. After fairly good crops of these grasses are raised for some time, the conditions naturally improve greatly. In many cases springs are developed, the grass sod holding the water in the hillsides. Kaffir corn is an example of what can be done in this line. Ten years ago this plant was an experiment in the United States. It was said to thrive in ground too dry for Indian corn, and was tested in western Kansas. In 1898 Kansas raised corn of this kind to the value of $5,688,380,—a reclamation of half a million acres of land in a single State.

Another method for helping the agriculturist is through the Weather Bureau. Daily signals are sent all over the country warning against approaching storms. It is the study of this department to avoid as much as possible the bad effect of drought and flood, and particularly of frost.

The most effective prevention against heat radiation that induces frost is by means of glass screens, which possess the peculiar properties of allowing the heat to come in from the sun, but are almost impervious to the "dark" heat rays reflected from the earth and plants. Lately, in California, muslin screens stretched on poles above the tops of the trees have protected whole orchards. In

A CALIFORNIA JACK-RABBIT DRIVE—RABBITS ENTERING CORRAL.

In the west the country is so infested with jack-rabbits that the whole community rises to drive the pests in an ever-narrowing circle that at last ends in a corral. Here they are leisurely shot or killed with clubs.

Florida, houses of laths are made with openings at the top the width of a slat. When placed in the proper direction so as to receive the sun but gradually in the morning, the fruit trees thrive, for at night only partial radiation of heat takes place. Sometimes crude petroleum or tar is burned near the trees, so that great clouds of smoke are produced that rival atmospheric clouds. This produces conditions that will not allow frost. To quote Professor Garriot of the Weather Bureau, "The amount of heat produced from burning one sack of wet straw weighing fifty pounds, and condensing water vapor near the earth, would be sufficient to raise the temperature twenty degrees in a space of seventy-five feet square and twenty-five feet high. If only one quarter of this heat remained within the region to be protected, which would seem to be a reasonable estimate, it would afford ample protection for almost any ordinary conditions."

Spraying and Sprinkling Plants

has been effectual in preventing frosts. In California, during threatening seasons, sprinklers are placed at the top of fifty-foot poles, which fill the air with fine mist. The owners of the ranch using these claim they have proved very successful in saving crops. In France frost bells are rung to warn the vine growers when frost is expected, and they immediately pour tar on the ground near the vines and set fire to it. In Louisiana and Florida water ditches are run between rows of trees. During threatening weather the water gives off heat as it passes along, thus warming the surrounding atmosphere and saving severe freezes.

Richardson N.Y. S.C.

THE BUCKEYE MOWER AT WORK

DISCOVERIES IN THE ART OF HEALING

THAT HAVE REVOLUTIONIZED MEDICINE.

Curing by Light Rays; Artificial Skin and Bone, Germicide, Etc.

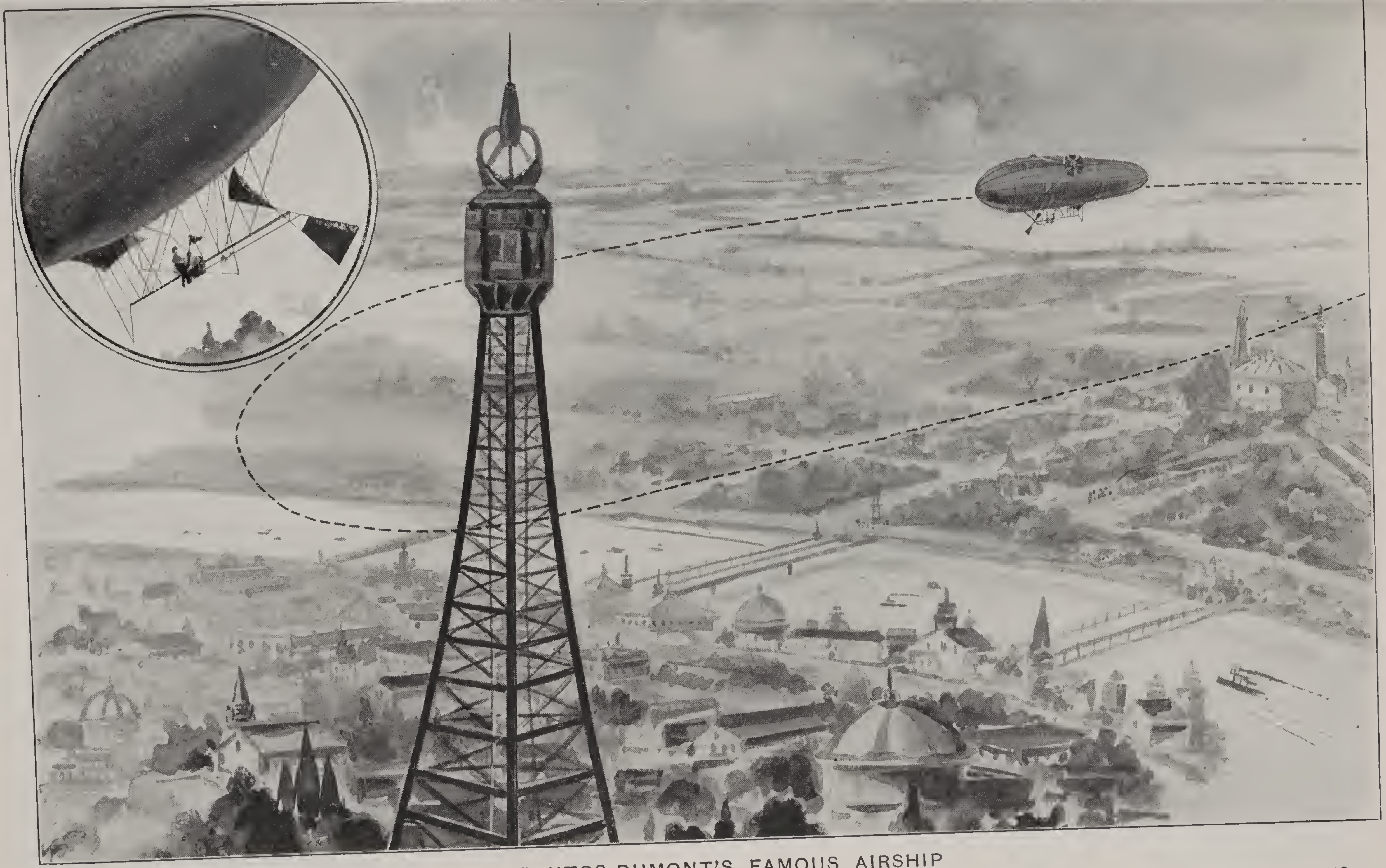
MANY diseases and injuries which a few years ago were considered incurable and always resulted in death are to-day successfully treated by the masters of medical science. Thousands of persons to-day owe their lives and healthy physical condition to the last decade's progress in surgery.

With the recent experiments in treatments for disease by electricity, X-rays, the Finsen violet light, and Pasteur serums for plague microbes, the world of science is fast advancing upon the diseases that flesh is heir to. Most scientists are coming around to the belief that a vast number of ailments commonly attributed to various or unknown causes all have their origin in microbes or bacilli,—tiny animal natures that feast themselves upon the tissues of the human body. With this thought in view, they have steadily sought out the particular germs of certain diseases, with the result that many have been classified The next study was to find some remedy that would effectually chase these intruders out of the system. At present scores of microbes have been found, some that cause one disease, others that cause others. Thus tuberculosis, or consumption of the lungs, diphtheria, plagues, cancers, and yellow fever, each has its own peculiar bacillus, and physicians are daily searching for more and surer enemies to these little pests.

Light in almost any form and pure air are very beneficial in these diseases, being deadly enemies to most microbic organisms. Consequently scientists are searching through these media for the desired remedies, and yet in some cases air on a sore surface aggravates the trouble. Dr. Murphy has recently invented a process for the treatment for consumption in which he pierces one lung by means of a small hollow needle. Through the aperture of the needle he admits a quantity of gas which collapses that lung in its diseased part. When the tissues of the lung come together they scarify or grow into one piece, and though the lung is smaller than at first, it is cured; and after a few years the constant exercise of the lungs tends to develop them to their former size Dr. Murphy was also the inventor of the famous "Murphy button" for piecing together severed intestines.

Cures by Liquid Air.

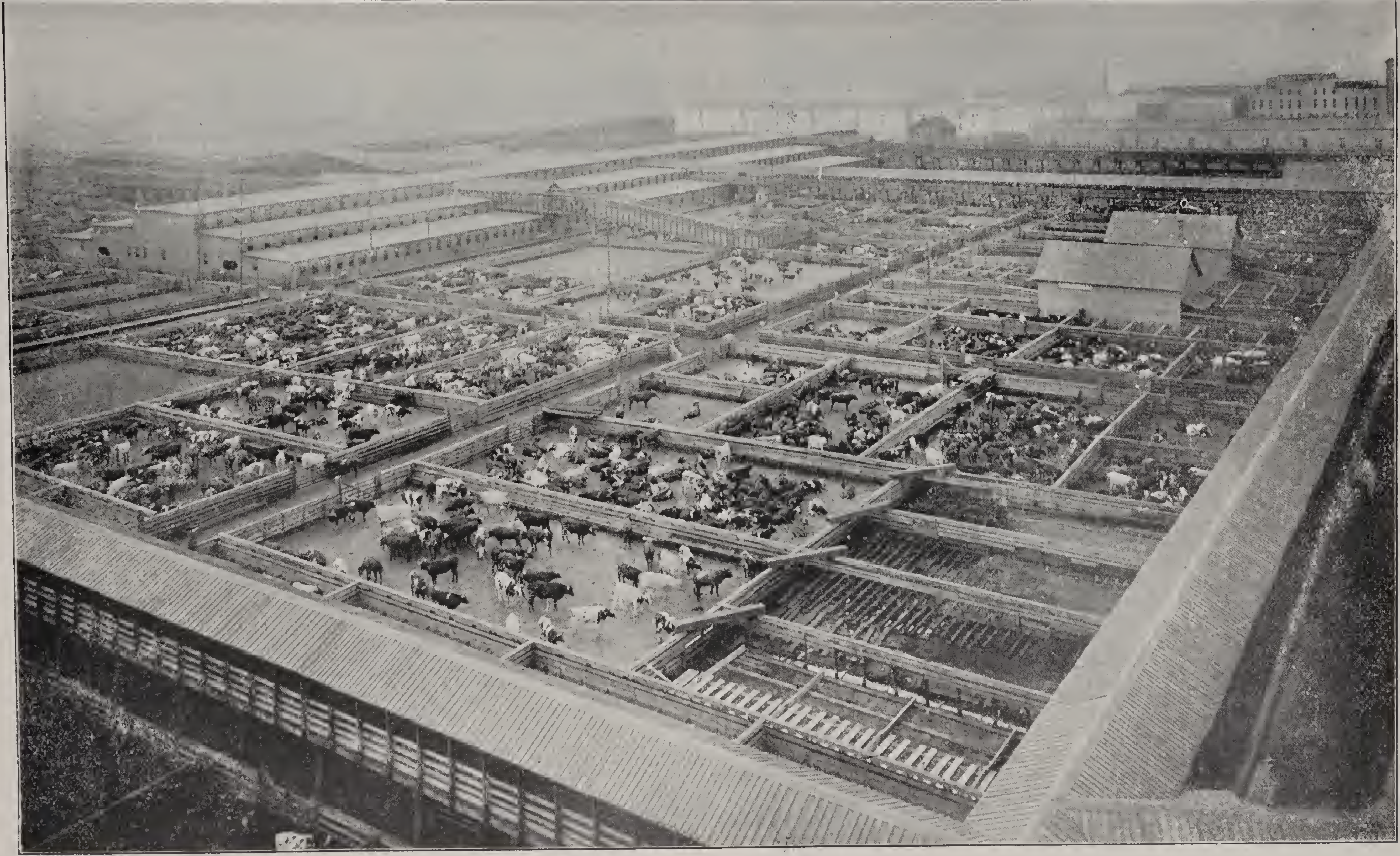
Liquid air, though in its crude stages for surgical uses, is yet hailed as a great boon to man. There is not to be found any other means of producing such intense cold, and the effect upon animal tissue of this strange property of air is nearly the same as intense heat, though no blister is occasioned. In cauterizing wounds, in removing foreign growths and killing putrid flesh, this method is sure and has few evil after effects. It



M. SANTOS-DUMONT'S FAMOUS AIRSHIP

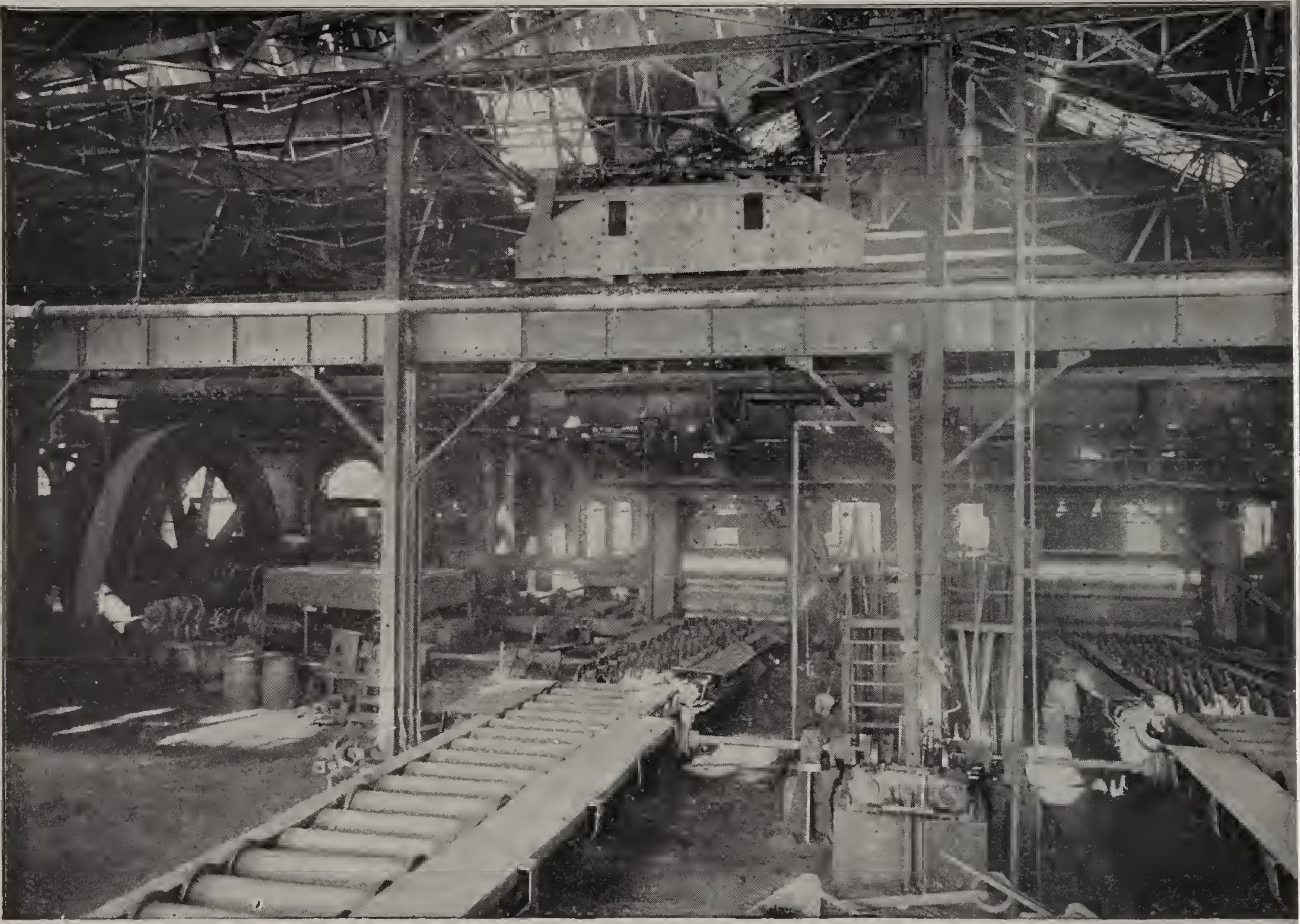
THE ENGRAVING SHOWS THE AIRSHIP SAILING ROUND THE EIFEL TOWER IN PARIS AT A HEIGHT OF 700 FEET. THE LENGTH OF THE AIRSHIP IS 103 FEET; DIAMETER, 11 FEET; PROPELLOR SCREW OF 16 HORSE-POWER MAKING 200 REVOLUTIONS A MINUTE

WINTER RECREATION AND PLEASURE



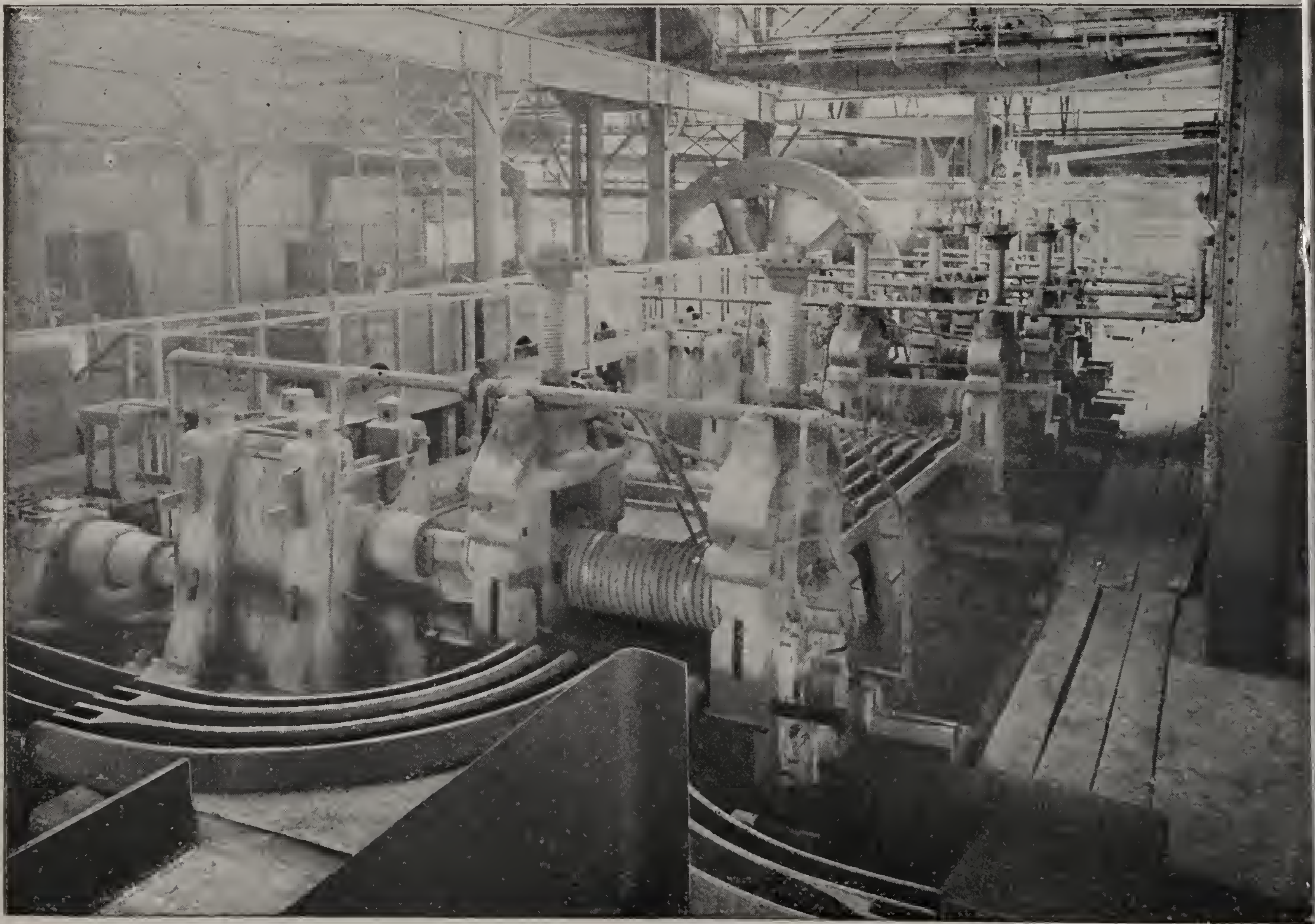
UNION STOCK YARDS—CHICAGO

SHOWING THE CATTLE IN THE PENS, IMMENSE SHEDS AND PACKING HOUSES. THE NUMBER OF CARS REQUIRED IN A YEAR TO BRING THE STOCK TO THESE YARDS WOULD MAKE A TRAIN THREE HUNDRED MILES LONG

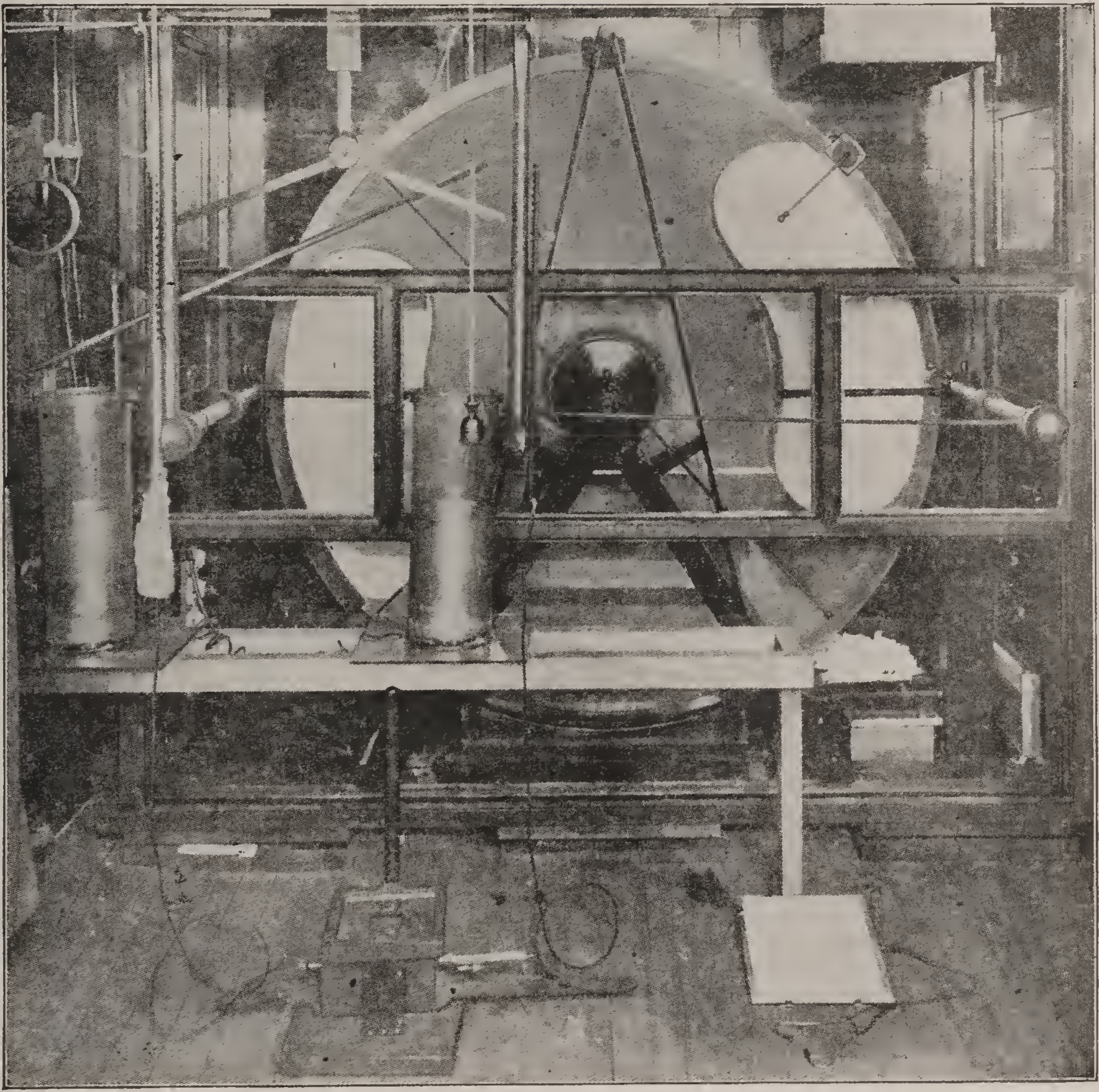


STEEL PLATE MILL

SHOWING IN THE BACKGROUND THE IMMENSE ROLLERS THAT PRESS THE WHITE-HOT STEEL INGOTS OR SLABS INTO IMMENSE STEEL PLATES FOR THE HULLS OF VESSELS, LOCOMOTIVES AND OTHER USES



• CONTINUOUS TRAIN-ROD MILL SHOWING THE IMMENSE ROLLER THAT PRESS THE IRON INTO LONG RODS cures corns, warts, boils, ring-worms, ivy-poisoning and ulcers, forms of rheumatism and neuralgia, kills typhoid fever germs, as well as diphtheria, and in part supplants the surgical knife. It has been used with success for eating out ulcers, and recently a case of facial erysipelas was treated by rolling a glass bulb filled with liquid air over the inflamed tissues, with the result that the heat subsided and the patient was entirely recovered.



A HUGE STATIC ELECTRICAL MACHINE FOR X-RAY WORK.

Diameter of revolving plate, 6 feet; of fixed plate, 6 feet 4 inches.

Finsen Light Cure.

Probably one of the greatest discoveries of recent years in medicine has been that of Dr. Finsen of Copenhagen for the cure of skin disease by subjecting the affected parts to strong violet rays of light. It is well known that such maladies are caused by bacteria, and when light in concentrated violet hues is cast upon diseased tissue it has been found that the bacilli are killed and the skin becomes healthy again.

The bactericidal property of light had previously been proved. Investigations at the Finsen Laboratory showed that that property, instead of residing in light as a whole, was peculiar to the chemical rays. These rays have a power to irritate the skin and to penetrate it. He exposed a specimen bacillus to bright sunshine in July, and found that the rays killed it in an hour and a half. The light from an electric lamp did the same work in about eight hours. It was learned that when the skin was full of blood it was harder for the light to penetrate. This was proved by fastening a piece of sensitized photographic paper behind a man's ear and placing him in the sunlight. After a considerable exposure the paper was unaffected. When the ear was afterwards pressed so as to squeeze the blood from it an exposure of twenty seconds turned the paper black.

Now, as soon as Finsen had learned that the blue rays of light had the properties of killing disease germs, he set about devising a method for its practical use. The result has been a set of lenses between which is a bright blue, weak, ammoniacal solution of copper sulphate. This water absorbs the red or heat waves and some of the yellow, but allows the blue, violet and ultra-violet rays to pass. To the surface of the skin to be treated is attached by rubber bands a lens between the glasses of which is run a stream of water to cool the surface and keep from blistering the skin, while at the same time the weight of the glass presses out most of the blood. When the rays are turned on, they at once penetrate to the spot where the germs are feeding upon the tissue and destroy them. It is said the treatment has been very efficient in smallpox, lupus or tuberculosis of the skin, baldness in small spots, and other epidermic ailments, and the patients say there is little or no pain, and are quite ready to undergo the treatment.

Pasteur Serum.

M. Pasteur of Paris, the inventor of the Pasteur water filter, and discoverer of hydrophobia serum, has recently been giving his attention to other methods for bacteria killing. In Portugal recently the plague broke out in a most frightful manner, and daily took off scores of victims. At Oporto all experiments with the Pasteur serum were completely successful, and in China, where the plague seemed to originate, cases have been reported where life was saved. The work, however, is extremely difficult, since the natives are very suspicious of the French and English doctors. The treatment consists of injection into the blood of serum prepared especially for its deadly effects upon the plague bacilli. When the treatment is undergone in time, it is rare that the patient is not saved.

In the Pasteur institute for rabies in Paris all the persons treated in 1898 were cured with the exception of three. For the thirteen years since the foundation of the institute to the end of 1898, 13,183 persons were treated in Paris, and out of this number only ninety-nine died.

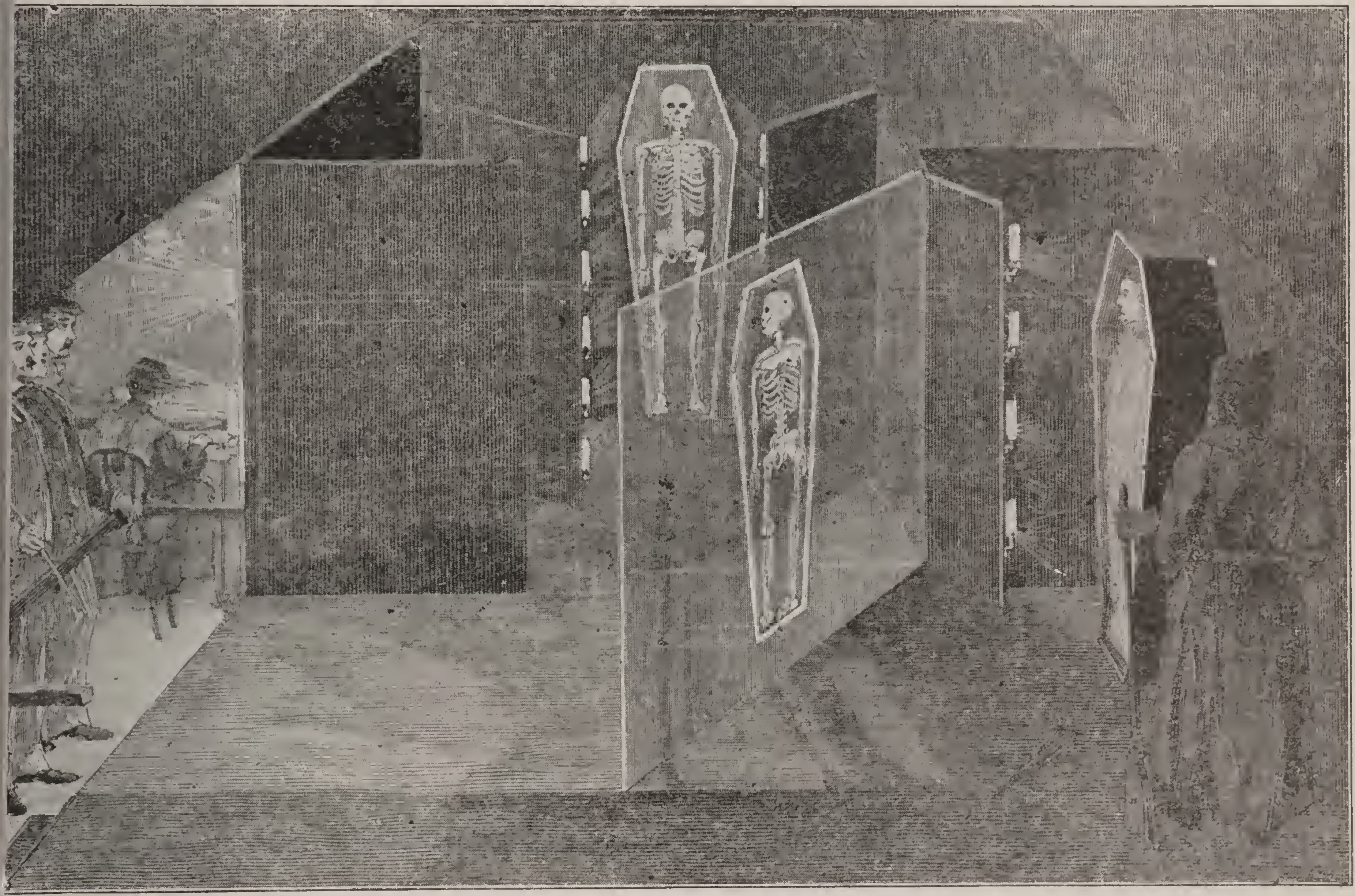
Anti-Toxin.

A serum called anti-toxin has recently been put into use as a cure for diphtheria. It is a brownish liquid prepared from the serum taken from the glands in the neck of a horse inoculated with the disease to fever point. The serum is allowed to stand and the anti-toxin comes to the surface and is skimmed off. By injecting the anti-toxin into the blood of the subject there is at once sent through the system a most deadly enemy to the diphtheria germs. One well-known physician in two years' practice with this remedy treated 2,100 cases in malignant form without losing one patient. The after effects are somewhat weakening, however, as the action of the anti-toxin tends to retard the heart's motions.

The X-Ray.

Brain specialists have hailed with joy the X-ray as a medium for learning whether clots of blood are pressing on certain parts of the brain, thereby causing insanity, or inaction of some of the faculties. One well-known lawyer in a fight with burglars received a severe blow on the head which rendered him insane at times. By means of a skiagraph or X-ray picture a shadow was seen that indicated a pressure on one of the brain convolutions. A cleft was made in the skull, the pressure removed, small bone particles placed over the cleft and the skin replaced. Apparently the lawyer's reason was restored.

In stomach diseases it has been very difficult to locate enlargements or to indicate conditions of the membranes. Recently saturated chemical solutions impervious to the X-rays have been poured into the stomach, and skiagraphs taken which resulted in remarkable discoveries. Other uses for these rays are constantly coming before the public Some time ago a Chicagoan suffered great agony from what seemed to be an abscess behind the base of the nose. By means of the Roentgen rays a skiagraph showed that the sufferer had in the cavity back of his nose a small sack containing thirty-two miniature teeth. An operation was performed successfully, but for which the patient might have died. It is hinted that mental conditions are expected to be discovered by the aid of this remarkable light, certainly nearly every other malady has been treated with a measure of success. The heart can be seen beating in



A SO-CALLED X-RAY EXHIBITION.

A reflection from the man in the coffin appears on the screen at the same spot that the reflection from a skeleton in the coffin is seen at the back of illustration. By turning on one set of lights and lowering the other, the man appears to be transformed into a skeleton, and the skeleton into a man, at the will of the operator.

one's breast, and enlargements or diseases can be promptly treated. Consumption of the lungs is discernible before it reaches its last stages, and ruptures, fractures and the presence of foreign substances can at once be noted.

Apart from medical use the X-ray was recently employed to explore the interior of a mummy casket that had never been opened since the time some old Egyptian Pharaoh had been wrapped in his burial clothes. Also mummified animals, so dried up that the family to which they belonged could not be ascertained, were easily classified after skiagraphs had been made of their bones and skulls.

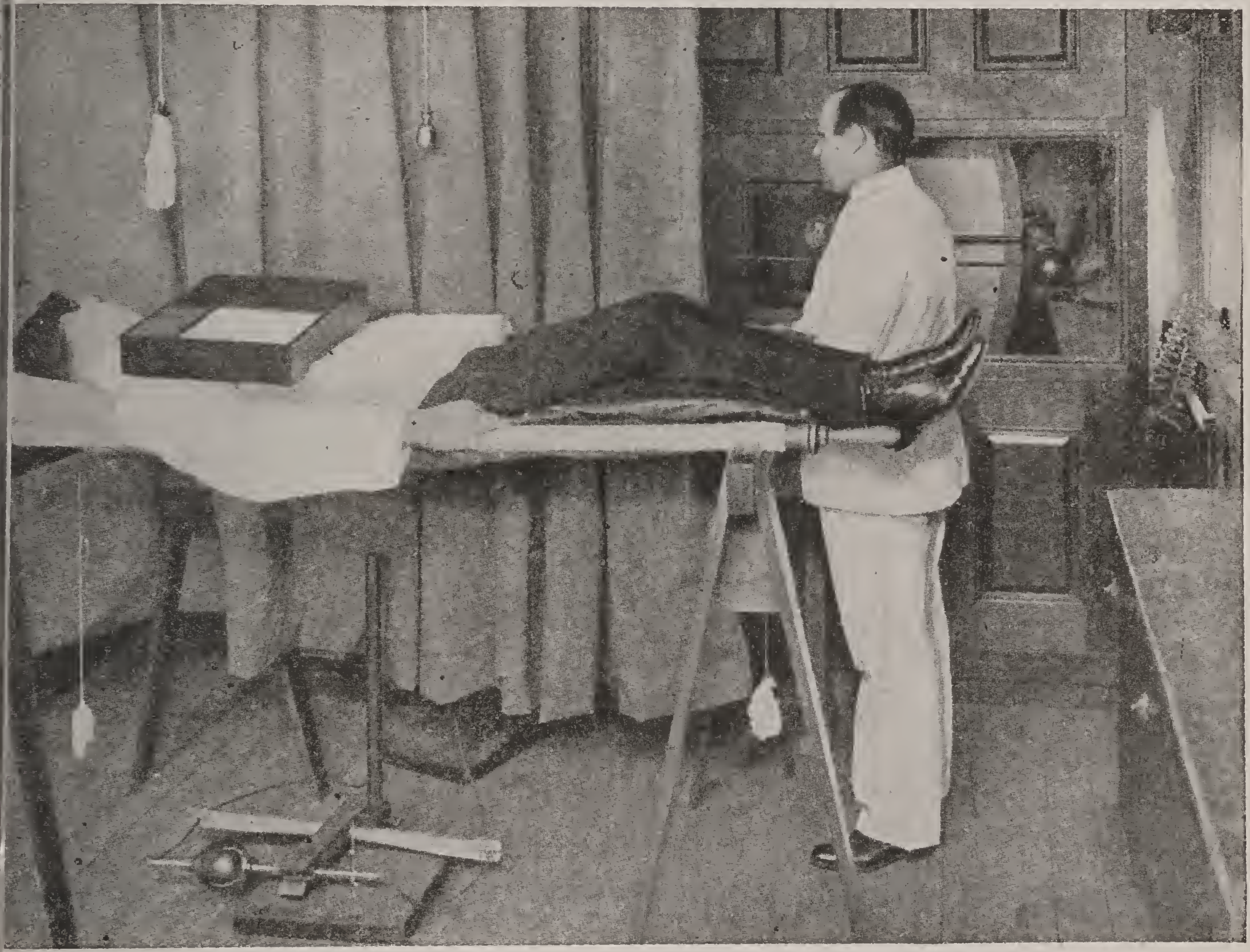
Hydrophobia.

Because of the apparent cruelty of the Pasteur treatment for prevention of hydrophobia, resulting from inoculation of small animals like the rabbit with rabies in order to procure the virus necessary to inject into the patient, many scientists have been studying other methods for curing or preventing this frightful malady, with the result that the Buisson system has quite a following. Many persons imagine yet that M. Pasteur undertakes to cure hydrophobia; this is a mistake, for from the point of view of this school of scientists, the disease is incurable; the only thing they claim for their treatment is that it would prevent rabies if given soon enough after the bite. This was considered weak by many physicians, and though the Pasteur institutes have been in a wonderful degree successful, the followers of the Buisson method assert that theirs is the more simple, humane and curative system.

For many years the vapor and Turkish baths have been considered of great benefit in relieving many ailments. Natives of Australia, and also of India, have a successful habit of at once taking violent exercise on beginning to feel ill, upon the grounds that the sweat produced thereby will cleanse the body of impurities. It is stated that years ago the Arabs knew of sweating as a cure for hydrophobia and other poisoning. The patient was swathed in woolen covering till all but smothered, placed in a small tent of camel's hair and almost air-tight, and then left to sweat it out. This treatment has been found effective even for snake bites. The Buisson treatment is of the same nature.

A good many years ago, Dr. Buisson, a French physician, was called to attend a woman attacked by hydrophobia. In bleeding her, as was the custom at the time, he cut his finger, and incautiously wiped it upon her handkerchief covered with her saliva. He cauterized the wound when he reached home, but to no effect, for he was taken down with the rabies almost a month after. His pain was so acute and his death so certain that he sought for the easiest method to die. For some time he had considered a vapor bath preventative but not a cure for hydrophobia. He now thought of this as possibly the least painful way to die, hoping that the warm vapor might produce a languorous feeling, letting him peacefully sink off into a death slumber. Accordingly he went to a vapor bath, desired a very high temperature, and at 127 degrees Fahrenheit was cured.

He at once commenced to experiment with his discovery, with the result that he soon claimed cures for the disease even in its last stages, and prevention positively in its early forms, without the danger of the use of possibly fatal methods. Since the time of his work his followers have gone on establishing branches all over the world. Marvelous cures have been reported from every quarter and sometimes with the aid of only the crudest applices. Recently a keeper of a Turkish th establishment in Milwaukee, Wis., rned that his dog had the rabies. In ying to coax him into a bath room, he s bitten in the hand. It has been ways considered impossible to cure a g of the rabies, but after several hours' reatment to a vapor bath, during which me the dog snapped and bit at every- hing in the room, he finally went to sleep nd awoke cured. The keeper took a imilar treatment at a high temperature nd never felt any evil effects from the ite. For country use it is maintained hat simply a pan of water over a lamp, with the patient sitting in the vapor and covered by heavy blankets, has effected cures.



METHOD OF MAKING A SKIAGRAPH EXAMINATION.

n the box on the patient's chest is a sensitive photographic plate. Below, on the floor, is the tube which develops the X-ray. The light passes through the patient's body and prints a shadow on the plate.

Two theories are advanced for the curative properties of the vapor bath: one is that it opens the pores and allows the impurities to escape; the other, that the intense heat to which the body is subjected kills the poisonous germs. When medical aid cannot be summoned, life may often be saved simply by reverting to an old-time sweat.

Appendicitis.

Operations for appendicitis, or inflammation of the vermiform appendix, have in

recent days been brought down nearly to perfection. In the old days of crude surgery, when one had peritonitis (intense inflammation of the bowels) he generally died, for this was not considered a case for surgery. But to-day, on the least sign of inflammation of the appendix, care is taken that medical aid is at once called to reduce if possible the swelling, and as a last means surgery is resorted to. The appendix is a long, narrow, worm-like tube attached to the cæcum (one of the bowels) on the right side of the abdomen near the hip. It is from three to six inches long, has a diameter about equal to that of a goose quill, and opens into the bowel by a rather imperfect valve. Inflammation of this tiny organ,—which, by the way, has no known use,—is rare in infants, and occurs in both males and females, though more commonly in the latter. It occasionally happens without the action of mechanical injury, and then it is supposed to result from the action of very small organisms, though it is due mostly from fecal concretions and foreign bodies such as grape and other fruit seeds, buttons, bits of bitten finger nails, and worms. It has also been caused by extension of catarrh of the intestines. These foreign bodies produce inflammation, which is generally attended by ulceration. If the poisonous matter is not gotten rid of, it will soon form a coating around the appendix and neighboring bowels; then the appendix is gradually eaten away, and when the abscess breaks it lets all the poisons into the abdominal cavity, which at once causes peritonitis, and frequently soon results in death. The most characteristic symptoms are pains, swelling, tenderness and rigidity of the abdominal wall on the lower right side. Experience has taught that almost without exception sudden pain in this region, with fever and tenderness, with or without a swel
(tumor), means appendicitis.

The Surgical Operation

starts with an incision from four to
inches long over the inflamed part. T
deeper tissues or muscles are drawn b
and held away from the opening
clamps. Occasionally an explorat
needle is used to probe for the absc
before the operation, but this is genera
condemned; however, after or during t
operation, this needle may be used t
good advantage. As soon as the abc
is reached, the contents are washed
with a weak antiseptic solution, a
search made for fecal concretions or f
eign bodies. Then the bowel is dra
out, and the appendix removed, if it h
not already been so perforated as to
nearly gone. After cleansing and se
ing up the bowel it is replaced in t
abdomen, and the incision in the wall
the latter is closed by sewing. Som
times, when an abscess occurs, the incisi
must be kept open to allow impurities
pass out; in this case the stitches a
made but not drawn close at first.

Skin and Bone Grafting.

Improvement along the line of ski
grafting and bone-making is going o
rapidly. It is no uncommon occurren
to-day to graft over burned or disease
spots large pieces of flesh and skin, take
from the body of a healthy person. I
bone-growing, animal bone has practicall
supplanted the insertion of foreign sub
stances, such as plates of silver and th
like. Decalcified bone chips (that is
bone with the lime taken out) are pre
pared from the fresh tibia or femur of a
ox by being kept in a weak solution o
hydrochloric acid for about a week. Th
periosteum, or outer skin of the bone
and the medullary tissue (marrow) ar

removed and the flimsy bone is cut into long strips about one-eighth of an inch wide. These, when they are to be used, may be cut into smaller pieces, and laid in the cavity of the patient left by the old bone being taken out. The skin of the wound is replaced, and gradually the grafted bone grows into the bone of the patient and performs its new functions as well as that with which he was born. For cranial defects, larger bones must be sought out and used in the same way.

Voyaging at Bottom of the Sea

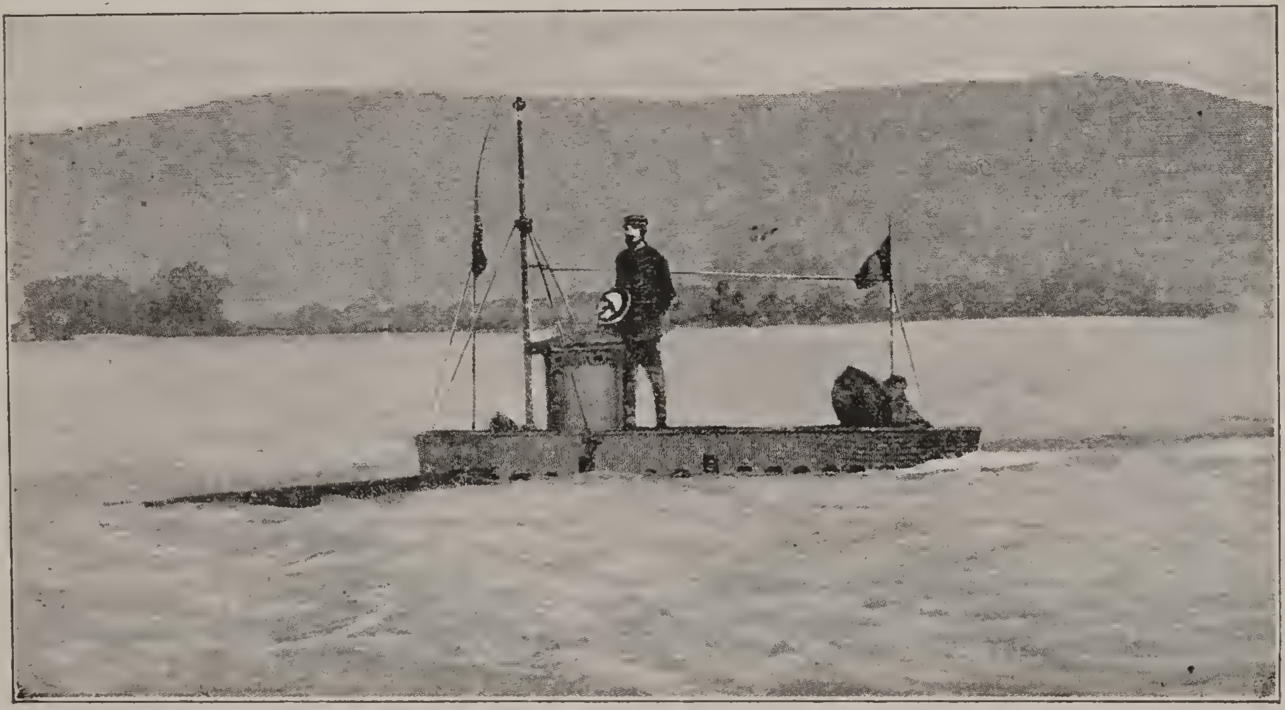
Wonderful Boats that Navigate below the Surface of the Deep.

SINCE the day when Jules Verne wrote his famous "Twenty Thousand Leagues under the Sea," there has onstantly been some inventor experinenting to solve the problem of traveling y a boat submerged under the surface of he water. Verne's boat, the "Nautilus," vas a marvel of imagination, but others s wonderful in their reality have appeared, which, though not perfect in all hings desired, yet do operate at the botom of the sea, float under the surface for everal hours, and come up again safely. uch boats are being constantly studied y the war departments of the great owers perhaps more than by any one lse, for reason of the uses to which they nay be put during war. Such a subnarine traveler, supplied with a number f torpedoes and with an air supply to ist the crew a few hours, could send to verlasting rest a whole navy, equipped hough it might be with the most modern nethods for protection and attack.

France, as much as any other nation, has been interested in this subject, and the result of her studies has been several boats brought forth by the skill and inventive genius of Gustave Zédé. This clever man, in 1886, built at Toulon an experimental vessel,

The "Gymnote,"

so as to test the principles he held with a view to embodying them in a larger and more complete war vessel. This boat was not much more than a large Whitehead torpedo, made of sheet steel in the shape of a cigar, being 56.7 feet long by 5.9 feet in diameter, and with displacement of thirty tons. To this shell were attached horizontal and upright rudders, so that she might be steered straight ahead by using the usual rudder, or might be made to dive or rise by use of the horizontal rudder. Electric motors with storage batteries supplied the power for the screw propeller, and a speed of seven knots an hour submerged and of nine knots on the surface were secured, while the batteries would run constantly for from four to five hours. Buoyancy was secured by a watertight compartment fore and aft, and sufficient compressed air was stored to supply the crew of five men when submerged. Besides these contrivances there was a heavy ballast attached to the bottom of the boat on the keel, that could be detached at a moment's notice in case of accident, thus allowing the vessel to rise. A long tube with reflecting lens and mirrors rose from the boat like a mast. This could be bent at an elbow at right angle and made to turn about, so that the image of any object at any point of the horizon could be reflected to the cabin of the boat when it was submerged. Without this "prismscope" it would be almost impossible to keep track of the enemy when on a cruise under the surface.



THE "GYMNOTE" TRAVELING AT THE SURFACE.
Showing conning-tower and prismscope just in front of the captain.

The experiments with the "Gymnote" were so wonderfully successful that the French government at once set Zédé to work making a large one for practical use. The result was the vessel about which all the countries are talking, and which, in honor of the inventor, has been named the

"Gustave Zédé."

The length of this boat is 147 feet, dian eter 10.75 feet, and displacement 260 ton The hull follows the general lines of th former model, being cigar shaped wit very sharp ends. The speed has bee increased to 8½ knots an hour below an 14 knots on the surface. Ten men coı stitute the crew, and enough stored air carried to last them while below In th nose of the boat is an opening for di charging an ordinary torpedo. She ha already operated in deep and shallo water with remarkabl success, and trips aver aging between sevent and eighty miles are he average runs, thus giv ing her power to mak a fighting dash at an enemy within a radiu of thirty-five miles, an return in safety.

Various boats havin the same general prir ciples have been mad and operated with muc the same success, amon others the Nordenfeld the Peral, Goubet, an the Holland, the latter a remarkabl vessel built by an American and use to some extent by the United State government.

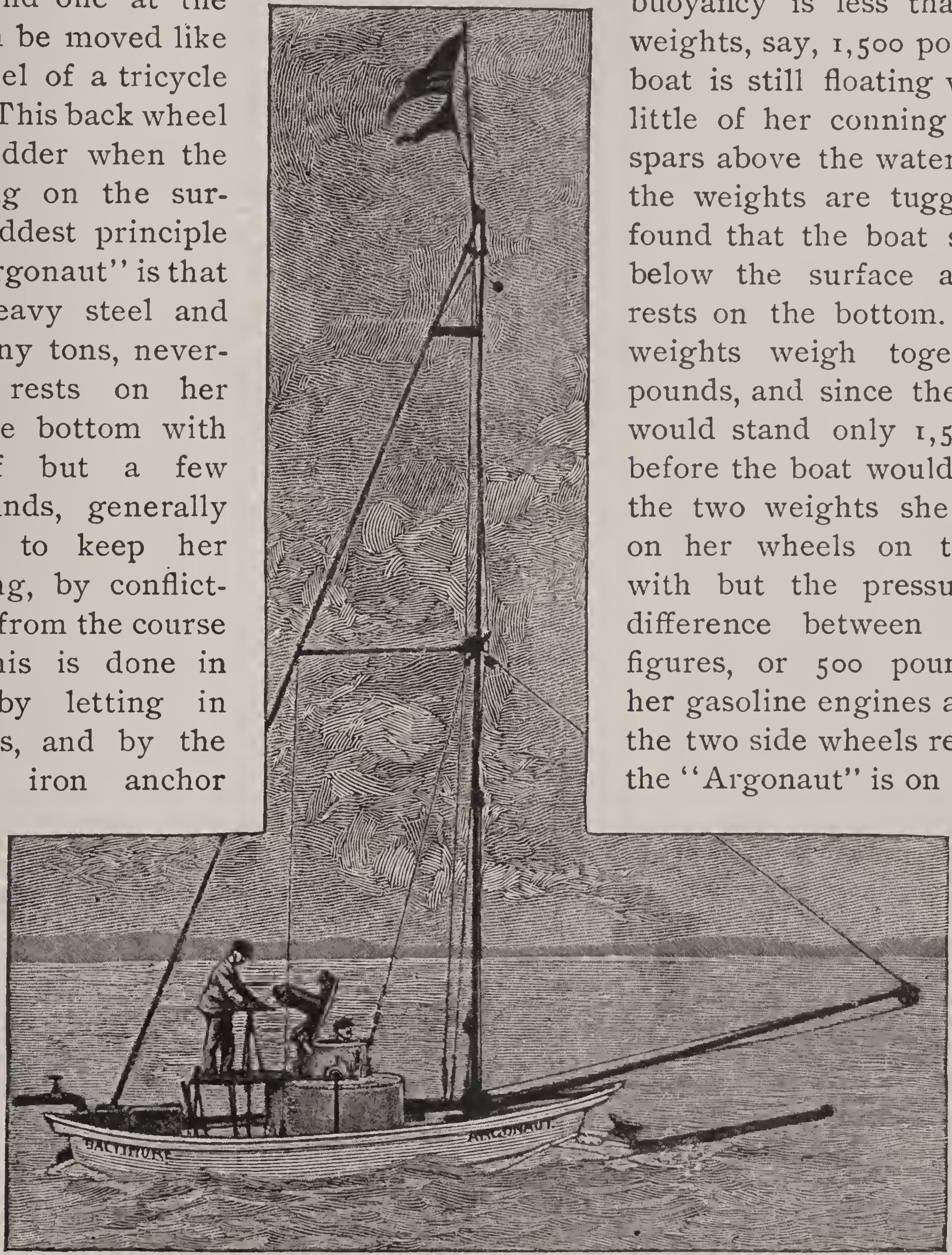
Of a different sort altogether, howeve is Simon Lake's invention,

The "Argonaut."

Knowing the difficulties that beset th path of the inventor who tries to keep hi boat floating under the surface in equilib rium with the water, he set about to con trive one that would travel on wheels a the sea bottom. In all types of floatin boats, there is great danger of misplacin the ballast and thus tipping the boat ove on her side. This was what Lake figured against, and accordingly he brought out a boat that would float on the surface propelled by a screw, yet when closed and loaded with its water ballast, would sink to the bottom and advance along the unknown highways by means of large wheels, after the style of a locomotive. There are three of these wheels, one at either side, and one at the back that can be moved like the front wheel of a tricycle for steering. This back wheel is also the rudder when the boat is sailing on the surface. The oddest principle about the "Argonaut" is that though of heavy steel and weighing many tons, nevertheless, she rests on her wheels at the bottom with a weight of but a few hundred pounds, generally just enough to keep her from deviating, by conflicting currents, from the course laid out. This is done in two ways: by letting in water ballasts, and by the use of two iron anchor weights weighing 1,000 pounds each. When it is necessary to go

Below the Surface,

the hatches are closed tight, the two weights, which are attached by cables to a windlass, are released and at once fall to the bottom. Then the water is let into the ballast compartments till the buoyancy is less than the two weights, say, 1,500 pounds. The boat is still floating with just a little of her conning tower and spars above the water, but when the weights are tugged at, it is found that the boat slowly falls below the surface and at last rests on the bottom. The two weights weigh together 2,000 pounds, and since the buoyancy would stand only 1,500 pounds before the boat would sink, with the two weights she now rests on her wheels on the bottom with but the pressure of the difference between these two figures, or 500 pounds. Now her gasoline engines are started, the two side wheels revolve, and the "Argonaut" is on her voyage

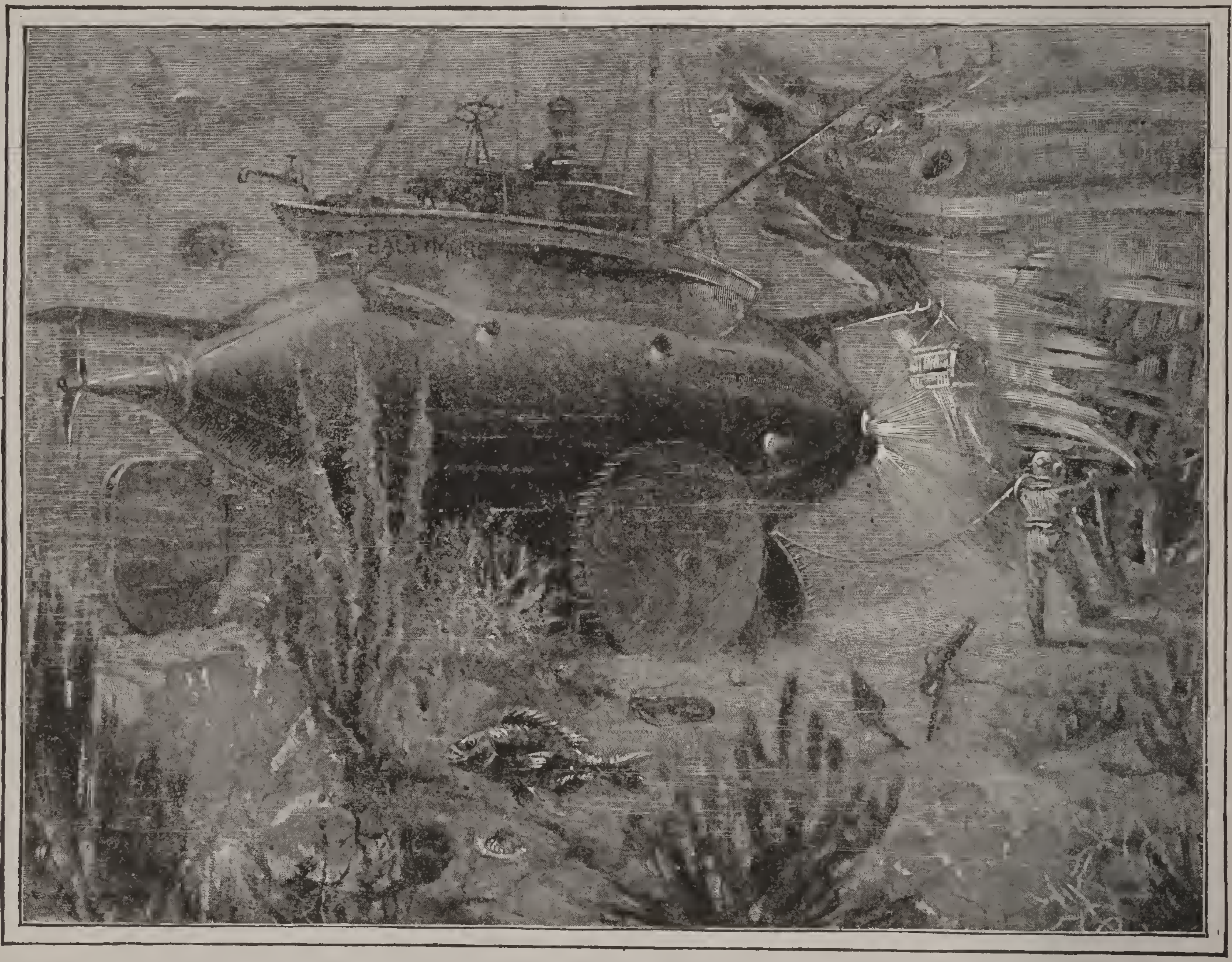


THE "ARGONAUT" FLOATING AT THE SURFACE.

Near the center is seen the open conning-tower with a man's head appearing. From this tower the boat is operated when below the surface. The man behind is steering by means of the submerged third wheel of the boat. Down one of the tall, hollow, steel masts, when nearly submerged, comes the supply of fresh air, and out at the other goes the exhaust steam.

among the queer sea monsters, aged wrecks and untold treasures.

The vessel is thirty-six feet long, cigar-shaped, with blunt nose and pointed stern, and is fitted with a thirty-horse power gasoline engine which operates the screw propeller, driving wheels, the electric dynamo, the air compressor, and derricks for hoisting the weights. Like many other submarine boats, she is supplied with air when all but below the surface, by a steel tube reaching up in the air in the shape of a mast. Down this comes a fresh supply of air, and out at another similar one goes the exhaust steam from the engine. In her nose is a searchligh that shoots out rays far ahead into th water; on her bottom is a heavy false ke that may be released in case of acciden allowing her to rise because of adde buoyancy. The vessel is guided by compass, and it is found that this entirely practicable below as well as above water, only it must be kept high above the machinery, which would otherwise affect her needle. Compressed air is resorted to for breathing supply when the boat is so far below the surface that the engine has to be stopped and the masts are entirely submerged. Then the elec-



A WEIRD SUBMARINE VOYAGE OF THE "ARGONAUT."

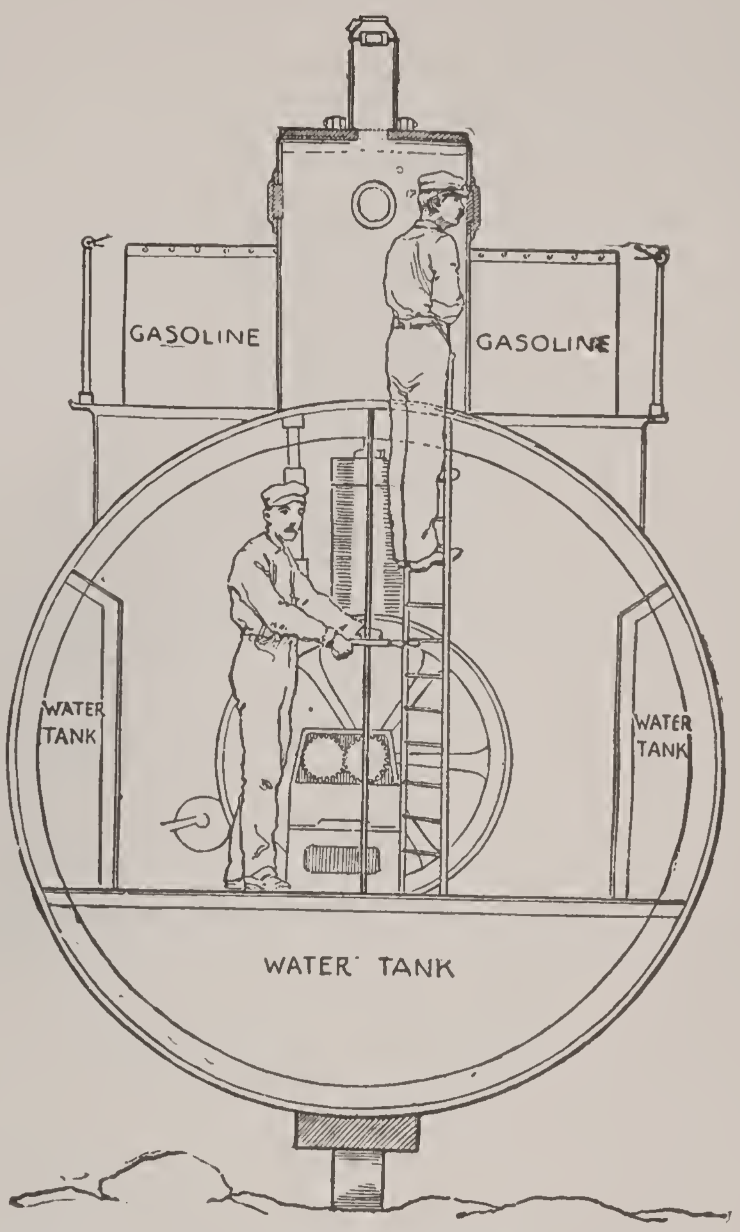
At the prow of the boat is seen a diver at work on a sunken vessel. He has just emerged from the open trap-door, and, with the aid of the powerful electric search-light in the nose of the vessel, is about t explore the unknown interior of a long-lost treasure-ship. About him, in all their glory, thrive the marvelous exotic plants of the deep sea, while, attracted and dazed by the fierce lights of the vessel, swarm the man-hunting shark and other queer ocean fauna.

tricity, stored up by the dynamo while the engine was working, is used to operate the machinery. Trips of 1,000 miles have been made in the "Argonaut" without landing, a great part of which was spent below. Air supply sufficient for five men for twenty-four hours is easily stored, and with occasionally running up near enough to the surface to let the steel tubes send down more air, these trips can ast as long as gasoline and food hold out.

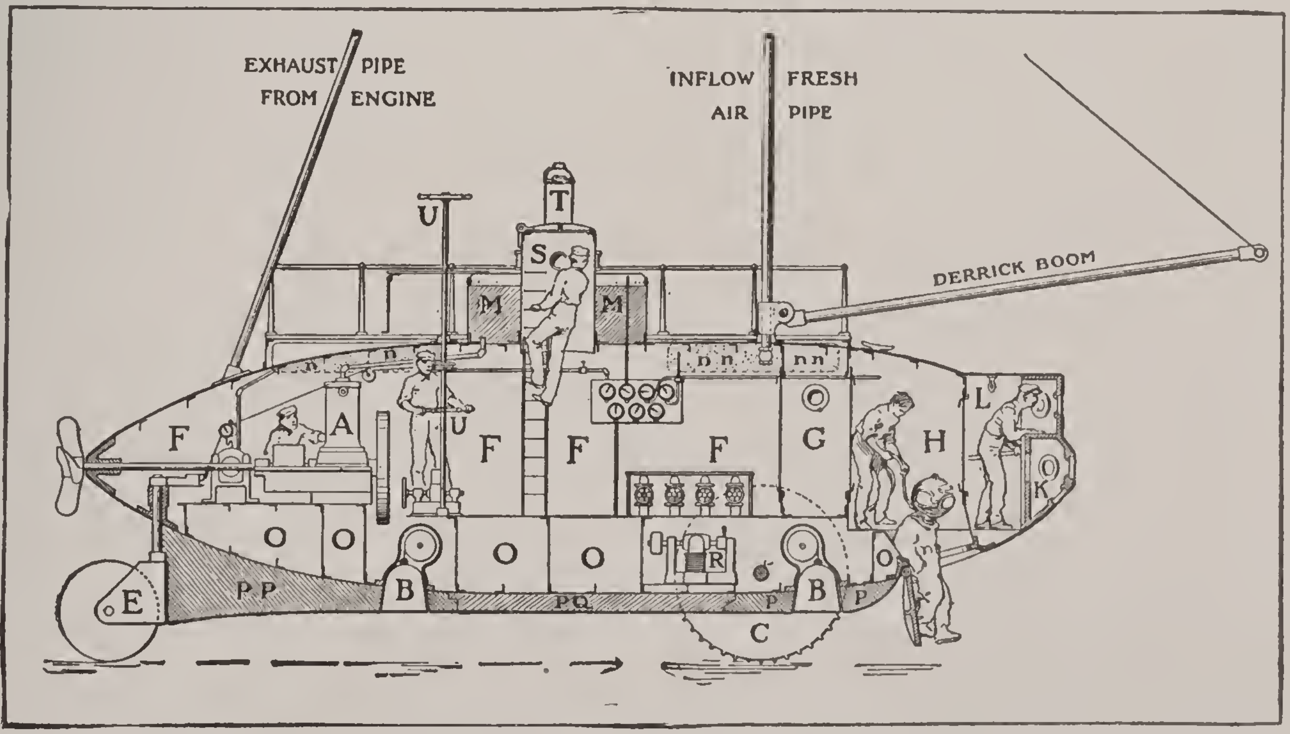
But simply to go below the surface and not be able to leave the boat would be of little avail. The "Argonaut" is therefore fitted with

Diving Apparatus,

so that men may leave the boat at any time, explore a wreck fasten a torpedo to an enemy's war ship, pick up a cable and cut it, or go a-fishing after sharks. This is all done by means of a hole in the bottom of the boat near the forward end. When a diver wishes to leave the boat, he puts on a diving suit and goes into the diving compartment, which has a great heavy door with rubber packing. This



Sectional view of "Argonaut" submerged, showing man in conning-tower making observations; also man steering with third wheel, which rests on the ocean bottom. Water tanks are filled when descending, and pumped dry when ready to come up.



A, gasoline engine, 30-horse power, which supplies all the power in moving and operating boat. BB, two anchor weights used in sinking boat. C, one of the two driving wheels. E, rudder and guiding wheel. FFFF, iving room, in which are placed the engine and all other machinery and apparatus for operating boat. G, ir lock; this affords a passage to and from diver's room without reducing air pressure. H, diver's room, whence is had free passage into the sea. K, bow compartment where searchlight is placed. L, forward ookout compartment. MM, gasoline tanks. NN, compressed-air reservoirs. OOOO, water-ballast compartments. PP, permanent keel. PQ, drop keel. R, dynamo. S, conning-tower. T, binnacle; the compass in this binnacle is in direct view of the outside steering gear, but from the conning-tower is read by reflection. U, outside steering gear. In general form the "Argonaut" is cylindrical, or cigar-shaped, with a very bluff bow, a pointed stern, and is 36 feet long.

door he closes, and cuts off the diving compartment from the living rooms and machinery. Then he turns on the compressed air till the pressure in the room is greater than that of the water that wants to come in. He then lets drop the heavy iron door to the hole in the bottom of the boat, and steps out, and not so much as a drop of water enters the vessel. Or suppose in time of war the telegraph cables of the enemy are to be cut. Instead of putting on a diving suit, the man to do the work simply goes into the diving room, turns on the air pressure, lets the trap door drop, and by means of a sho wooden stick with a hook in the en reaches down and picks up the cable an cuts it.

The possibilities of such a boat are ver great, both in time of peace and war. I salvaging wrecked ships and treasures submarine boat would do marvels, as we as in pearl, sponge and coral fishin The work of laying foundations for ligh houses, piers and breakwaters would b wonderfully facilitated, as well as in lan ing armies during a blockade, and blow ing up war ships.

UNIVERSAL DISARMAMENT.

THE PEACE CONFERENCE OF THE CZAR.

AUGUST 24, 1898, by order of Nicholas, the emperor of Russia, Count Muravieff, the Russian minister of foreign affairs, handed to all the foreign diplomats at St. Petersburg a note calling for a meeting the next year of all the countries interested to discuss the question of decreasing the armed forces of the world, with a view to an universal peace sometime in the near future. It held that recent expansion of the governments and armed forces of the world were to be deplored, both from a humanitarian and an economic point of view, and that the czar held it his duty to help ward off the calamities that must soon threaten the whole world. After a session of some six weeks at The Hague, capital of the Netherlands, on July 24, 1899, the final acts of the conference thus called together were embodied in a final act. This ac held that there should be a permanen

Court of Arbitration

for the pacific settlement of all international disputes; that asphyxiating an deleterious gases should not be used i projectiles from balloons in war; th dum-dum bullets, or those made of so material that will easily expand in th human body, should be prohibited i war; and that it was desirable that a countries limit their great military force which so burden their own people an threaten the world. It also held that i was the right and duty of neutrals to offe their services toward the peaceable settlement of difficulties between othe nations; and that all private property o land should be inviolable in war, and tha in naval war towns and villages shoul not be bombarded.

OUR NEW POSSESSIONS.

THE UNITED STATES AT THE EQUATOR AND EXTENDING NEARLY HALF-WAY AROUND THE GLOBE.

New territory to the extent of 170,000 square miles, with populations numbering over ten millions, now under the protecting folds of the American flag.

THE Philippine Islands lie just east of Cochin China, being separated from it by the China Sea, and are between he fourth and twentieth degrees north atitude, and 116 and 126 east longiude. There are thought to be about 2,000 islands in the group, though this is not certain. A recent writer says: "The number of islands which form the Philippine archipelago will astonish many readers. It is said to approach 2,000. There are among them two which are larger than Ireland, namely, Luzon, with 42,000, and Mindanao, with 38,000 square miles. There are other islands with 5,500, 5,000, 4,500, 4,000, 3,500, and 3,000 square miles." Of the whole number some 600 are inhabited. The estimates of the population vary from 6,000,000 to 9,000,000, the fair estimate being about 7,500,000. Nearly half this number inhabit the principal island of Luzon, on which is the capital, Manila, and where nearly all the fighting of the Filipino war has taken place.

As many races almost as islands people this odd archipelago. Most important are the

Tagals of Luzon,

who number about 2,000,000 souls, and who are leading in the rebellion against the United States government, headed by their chief, Aguinaldo. They are a short, copper-colored people of the Malay race, and of exceptional cleverness. Next to them in point of intelligence are the Vicols, or Bicols, who occupy the Camarines peninsula and the islands of Catanduanes, Burias, Ticao, and half of Masbate. They resemble the Tagals, and number about 400,000. The third division of the people are the Visayas, or Bisayas, who occupy the islands between Luzon and Mindanao, and are estimated at 2,500,000. Besides these are the Moros of Sulu, the Negritos and some others of the Malay race. Little is needed or desired by these natives. The soil of the islands is rich, and the rivers teem with fish; so that with a fighting cock, which every Filipino dearly loves, and scanty attire, he leads a happy-go-lucky life.

The islands were discovered by Magellan, who landed on the island of Cebu in March, 1521, and soon after lost his life in a skirmish with the natives. In 1565 a fleet from Mexico took possession of the islands, and in 1570 a settlement was established on the Manila River, which place became the capital of the Spanish possessions in the Philippines, and continued such till the late war. Before the arrival of the Spaniards the place had been under the dominion of the Chinese. The Dutch made an unsuccessful attempt to capture Manila in 1606, and the British succeeded in a capture in 1762. The Philippines would probably have been British to-day, had not Spain promised to ransom them for $5,000,000, which, however, remains unpaid to this day. Rebellions have been frequent in the islands ever since Spanish rule, those of 1822, 1841, 1842, 1872, 1896 and 1897 being the most important. The revolts have all had a common cause, that of freedom from Spanish tyranny. When the United States went to war with Spain, the Filipinos, under several chiefs and headed by Aguinaldo, assisted the Americans in hopes of gaining their freedom from Spain. But after the treaty of Paris, which ceded these islands to the United States pending the establishment of a government for and of the native inhabitants, the Filipinos rose in

Revolt

against seeming annexation to the United States, and since that time have conducted a sort of guerrilla warfare against the American troops. An actually established government is claimed to exist by the natives, but the capital seems to travel with the fleeing president. At present the government of these islands is that of martial law, aided to a degree with civil courts maintained by the natives, who likewise aid in the government of the municipalities.

There are

Two Seasons,

a wet and a dry; the first from June to November, the dry season from November to June. In the wet season the country is inundated, the roads are impassable, and the bridges disappear. The annual rainfall is from seventy-five to ninety-one inches. The hottest months are April and May; the droughts a then long, and the ants and mosquito troublesome. The coolest months a December to February. The avera temperature is 80 degrees. Cyclone typhoons and hurricanes visit the coa and earthquakes are frequent. Ma craters of extinct volcanoes are found, a some active ones are in operation. Th highest mountain of the group is that Apo on Mindanao, which is 9,000 fe high, while Halcon, in Mindoro, reach nearly 8,900 feet, and Majon, in Luzo exceeds 8,200 feet.

The soil of the islands is very fertile, an the products are sugar, hemp, tobacc rice, coffee, gums, cotton, indigo, coch neal, and cocoanuts. In the forests gro rattan, bamboo, ebony, logwood an numerous other hard woods and gu yielding trees. The celebrated Manil hemp is not made from hemp, but is th fiber of a species of banana. The Philippines are fabulously rich in gold, and copper and coal have been discovered in larg veins. We had exported to these island before the war merchandise amounting t about $100,000 yearly, and imported abou $5,000,000, but since the islands are no American dependencies, this commerc has been greatly increased.

Sultan of Sulu and His Island Domain.

Mohammed Tamajamalu Kiran, Sulta of Sulu, the monarch who is now, or wh will be, something of an issue in American politics, because of his recent treat acknowledging American supremacy, i the ruler of 140 islands in the Philippines of 120,000 subjects and a dozen wives. The sultan, his people, his wives and the 75,000 slaves in his islands are now subjects of the United States. He is known by many titles other than sultan, for example, "The Stainless One," "The Spotless One" and "The Mountain of ight." His dress is simple, consisting f one garment, after the fashion of a modern night shirt. He is a short, fat man, with a round, boyish face and big, aucer-like eyes. Kiran lives in a small ouse protected by a stone wall ten feet igh and quite thick. The first floor contains only one room, a large, bare apartment. The sleeping-rooms of the palace" are on the second story. The Moros—that is the name of the sultan's ubjects—have the reputation of being an nnocent, harmless people, but when General Bates visited the islands on the Charleston he found that most of the nhabitants went about armed. The mother of the sultan is regarded as the most beautiful woman among her people.

THE MARIANA OR LADRONE ISLANDS.

The Mariana archipelago is a chain of slands in the Pacific stretching north and outh a winding distance of about 600 miles, and embraces some seventeen slands, having an area of about 500 quare miles. The islands were discovered in 1521 by Magellan, and were amed in honor of Mariana of Austria, wife of Philip IV. king of Spain, though in he later days of piracy they were dubbed he "Ladrones" or "robbers," because hey were supposed to be the stronghold f those pests of Asiatic waters. They are lmost directly east of the Philippines, at distance of about 1,200 miles. The rincipal island of the group is Guam, or Guahn, which covers nearly one-half the rea of the archipelago. Formerly, when pain first took control of the islands, the atives numbered about 120,000, but the ppressions were so great that one-half hat number were killed off, and the reater part of the rest fled to the Caroline slands. Colonization was tried from the Philippines, but these emigrants died of epidemics. In 1760 the population had been reduced to 1,600, and in 1875 but 600 survived.

The climate is very moist, several rain squalls occurring every day, which, however, the natives do not seem to mind, for it keeps the air cool. The natives grow sugar cane, rice, corn and melons. The soil is well adapted to coffee growing, but this is done only to a limited extent, while all sorts of tropical fruits abound.

Commercially the group is of little importance, for the natives need little, and no trade is done. However, the possession of Guam by the United States, which came about by the treaty of Paris, is of some political value for a coaling station, and as a near neighbor to the Philippines in case of war.

THE SAMOAN OR NAVIGATOR'S ISLANDS.

The Samoan group consists of thirteen islands, of which nine are inhabited, lying in the south Pacific Ocean, between 13 and 14 degrees of south latitude, and 169 and 173 west longitude. They are about midway on a line drawn southwest from the Sandwich Islands to New Zealand. A population of about 40,000 people, including, besides natives, Americans, Germans and English, covers the area of some 1,125 square miles. Upolu, Savaii, Tutuila and Manua are the islands of most importance. Apia, on Upolu, is the chief town, and a good seaport, while Pango-Pango, or Pago-Pago, on Tutuila, is possibly the best harbor in any of the Pacific islands, and being in direct route from San Francisco, is developing into an important port.

The climate of the islands is equable, averaging about 82 degrees, while the rain is rather evenly distributed throughout the whole year. Tropical plants of all kinds abound, and while the commerce of the group is small, exports of cotton and the dried meat of the cocoanut are made to Hamburg and San Francisco. The natives are well developed and intelligent.

The government by chiefs was unsatisfactory, so that in 1873 they desired the protection of the United States. In 1875 a native was elected king again, but with an American for prime minister. In 1878 a treaty between the islands and the United States was effected which gave us great powers, and later on similar treaties were made with Great Britain and Germany which led to a tripartite protectorate over the islands by these two governments in conjunction with that of the United States. A chief justice appointed by the three powers to some extent controlled the courts and advised the king, while the consuls of the three countries took a prominent part in the government. From time to time jealousies arose between these three countries, and annexation to one or another of them was proposed. In 1898 and 1899 a serious difficulty was incurred because of the death of the reigning king, and American forces were landed at Apia with threats of bombardment. Trouble between the German and American officials was at last patched up, and a division of the islands among the three countries will be the result.

Tutuila,

the island that will come to the United States as the issue of the Anglo-German treaty, gives us the finest harbor of the south seas, Pago-Pago. The island has an area of 55 square miles, being nearly 17 miles long and from 3 to 5 miles wide. It is well wooded and fertile, and has some rivers of fair size. The harbor has been held by the United States since 1872, and from a strategic point is very d able, especially as a naval base of op tions in the Pacific. The harbor natural one, and well sheltered, and be easily fortified. It is 2,000 miles f Australia, twice that distance from Philippines, and 5,000 nautical miles f San Francisco. With the Philippine the possession of the United States, new dependency is invaluable.

PORTO RICO.

The island of Porto Rico, or, accord to the Spanish spelling, Puerto R meaning "rich port," is fourth in size the Greater Antilles, being exceeded Cuba, Santo Domingo and Jamaica. lies between the seventeenth and ni teenth parallels of north latitude, and sixty-sixth and sixty-seventh degrees longitude, and contains about 3,668 squ miles, being about 35 miles broad and miles long. The island was discove by Columbus on his second voya November 16, 1493. Ponce de Leon, t celebrated explorer, was one of the fi Spanish governors, and the wron heaped upon the natives by his arbitra rule led to revolts. Several attacks up the island by English and Dutch forc met with no success. The last one pr to that of our late war was by the ce brated British commander, Sir Ral Abercromby, who laid siege to San Ju in 1797 for about two weeks. Owing insufficient forces, he had to withdra and from that time until the bombar ment of May 12, 1898, by Admiral Sam son, that city had had a century's respi from the enemies of Spain.

Several rebellions by the people o curred with the hope of throwing off th galling Spanish yoke and establishing republic. One of these was in 1820, a other in 1867, the latter being broken up b e eruption of a volcano, which so scared he people that they again gave in to Spain. When General Miles, with the

American Forces,

anded on the island in the summer f 1898, he was greeted everywhere as he benefactor of the down-trodden natives, and from town to town his vicorious troops were met by the officials of the provinces, who gladly turned over he government to that of the United States. October 18, the flag of the United States was raised over San Juan, the Spanish evacuation having been completed, and January 1, 1899, the entire government, according to the Treaty of Paris, was placed in our hands.

The island has a population of 815,000, of whom about 300,000 are negroes, the emainder being mostly Spanish, besides some Americans, English, Germans, and others of European nationality. The surace of the island is broken by hills and ow mountains, one range of which passes hrough it from east to west. The highest point of this range is El Yunque, which is about 3,700 feet above sea level. There are some 1,300 streams of remarkably pure water running into the sea, of which forty-seven are rivers of considerable size. Thus the island has abundant water supply for large herds of cattle.

The Climate

is exceptionally salubrious, mainly on account of there being little stagnant water. Heavy rains occur in the north from May to September, sometimes amounting to seventy inches. In the south there is little rain at all, while over the whole island in the winter the air and sea breezes are delightful. Coffee, tobacco, and sugar cane are grown in profusion, while exceptionally fine cotton is cultivated. Besides these staples the island exports annually large quantities of cattle, hides, timber and molasses, while flax, ginger, rice, maize, citrons, lemons, oranges and other tropical fruits abound. Traces of some ores have been discovered, including gold, iron, copper and lead.

No portion of the West India Islands is lovelier or in better condition than Porto Rico. The climate draws many foreigners there for the winter; the people are self-sustaining and hospitable, though somewhat ignorant and superstitious. Slavery was abolished in 1873, and the island is remarkably free from disorder. At present the government is temporary in nature, awaiting the decision of Congress as to the best methods of governing a race of people so different in all things from the average American.

The Modern Newspaper.

A GLIMPSE OF THE WORKINGS OF THE GREATEST AGENT OF MODERN CIVILIZATION AND EDUCATION—HOW A DAILY PAPER IS WRITTEN, PRINTED AND CIRCULATED.

Including Descriptions of Photo-Engraving, Stereotyping, and Printing by Monster Presses.

TIME was when the owner of a newspaper was editor, reporter, typesetter, "devil," presshand, and circulator, while besides the duties incumbent on these positions he had to see to the odds and ends belonging to no one in particular. But the day of the old Franklin hand press, and of setting up his articles in type before his case as the inspiration came to him, has passed, and now, with the division of labor, and the marvels of machinery, it is possible for the subscriber a hundred miles away to read in comfort at his breakfast table the metropolitan daily paper at the same time that other subscribers are reading it in the city where it is printed. To the persons who go to bed at nine o'clock and rise at five it is amazing that thousands of men and women are working while they sleep, and the sight of a large newspaper plant in full swing of operation would be still more wonderful.

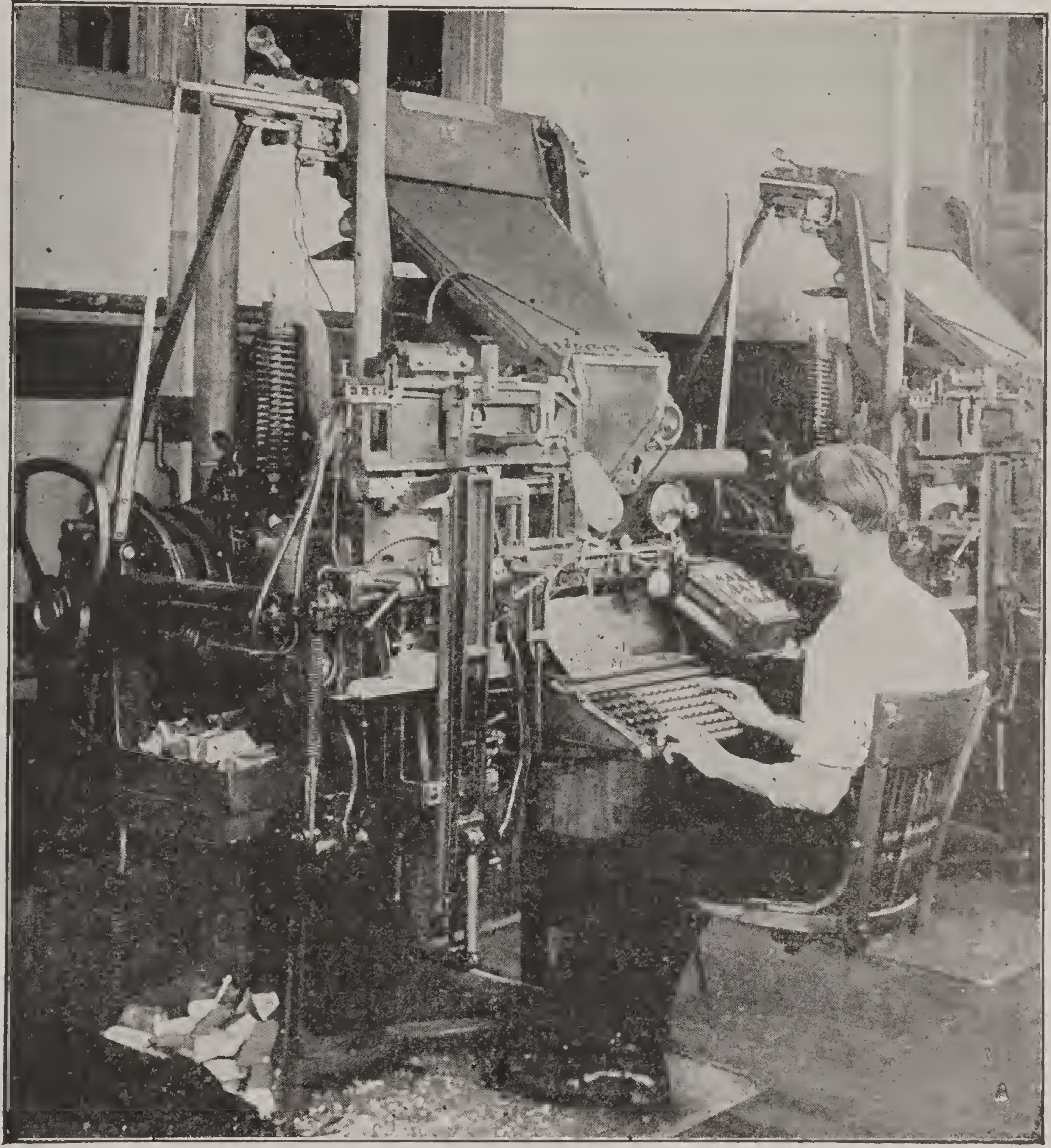
Every well organized paper is divided into a number of departments, just like a government, with a head or ruler over each. In most papers there are three main departments: Business, Editorial, and Mechanical, and each of these has numerous subdivisions.

Upon the business departments d volve the duties of managing the capit invested, paying the salaries, etc., and th two greatest of all duties upon any pape that is expected to make money: the ge ting of advertisements, and the circul tion of the paper to the subscriber The editorial department has control c the reading matter and its preparation while to the mechanical departments ar left the duties of setting the stories, editorials and advertisements into type, th molding of the stereotype impressions o this type into great half-cylinders that ar to be placed upon the monster presses and the work of bringing forth fro these presses the folded paper ready fo its reader, at the astonishing rate of fro thirty to fifty thousand copies per hour.

The Editorial Staff

of a paper is divided into several parts the managing editor is head over every one in his department, and to some extent is consulted in other things than those pertaining to his own department the city editor is directly under the managing editor, and controls a staff of reporters whose duties are to gather up the news about town and present it in readable and interesting form. Besides these two editors and the staff of reporters, there are a number of men who write editorial comments on the great events of passing interest to the public; on them to a marked degree falls the lot of shaping a community's opinion on political or public questions. Then here are the special writers who write dramatic criticisms, sporting news, literary, art and musical notes and criticism, and last, but not least, on the up-to-date paper, the funny story man. Contrary to general opinion, the reporter does not go aimlessly about town looking for news. The modern city editor almost knows the news before it happens, and therefore has men suitable for the occasion on the spot waiting for it.

At 12:30 p. m. the reporters of a morning paper congregate in the "local" room and wait for the summons of their chief. For weeks ahead every event of importance is pigeon-holed, every article in any paper noting an incident of interest is cut out and kept on a spindle with the date marked when it is likely to be available. Then there is a whistle at the speaking



(*Courtesy of the Chicago Record.*)

A LINOTYPE MACHINE AND OPERATOR.

The operator is at work setting "rush" copy. At the top of the machine is the fan-shaped magazine which holds the matrices of the letters. At the left, in the box and on the floor, are seen blocks of metal o be melted and used in casting the "line o' type," while at the left, near the top, is the large arm that eaches down and picks up the matrices for distribution after the line has been cast in metal.

tube in the local room; a man jumps to answer it; the city editor is calling for "Brown" or "Jones." That man hies himself to his superior's office, and here is given a definite "assignment" or job to go to this or that place and find out a particular thing. Sometimes some well-known man is in town; then he is told to "get a story out of him." There is no such word as fail when the city editor tells a man to do thus or so; failure means forfeiture of his position, and even though the city editor has been a reporter once himself and knows how impossible are some of the tasks set, yet he is never-relenting, and no excuses go.

When the man comes back from his assignment, he reports to his chief and is told to write so many words, to "play it up strong," or to "make it funny." After this is done, the reporter waits about the office for another assignment or the good news that he may go home. His "copy" or manuscript is sent up to the printer, and after being set in type is "proved" and copies of the proof come down to men experienced in correcting according to the particular style of the paper. Some phrases are never used on one paper that are of habitual occurrence on others. These "desk men" must see that all copy conforms to the paper's "style," and that nothing libelous is printed. After the proof is corrected, it goes back to the printer, who makes the correction in type, and then the article, or "story," as the reporters call it, is ready for its trip down to the stereotypers.

Photo-Engraving.

But possibly the story is of sufficient importance to need illustrating. No newspaper is complete without a corps of artists and a photo-engraving plant. Suppose the story is that of a great fi At once the city editor on hearing the t of the fire alarm in his office calls f reporters and artists to write up and illu trate the fire. The reporters get th news, while the artists with paper an pencil sketch the most interesting sigh at the fire. This must be done in ligh ning-like hurry, for time is a great fact in newspaper work. On coming back t his office, the artist redraws in India in the crude sketch he has made. Th sketch is generally several times large than it will appear in the paper, for th process of engraving reduces the siz somewhat.

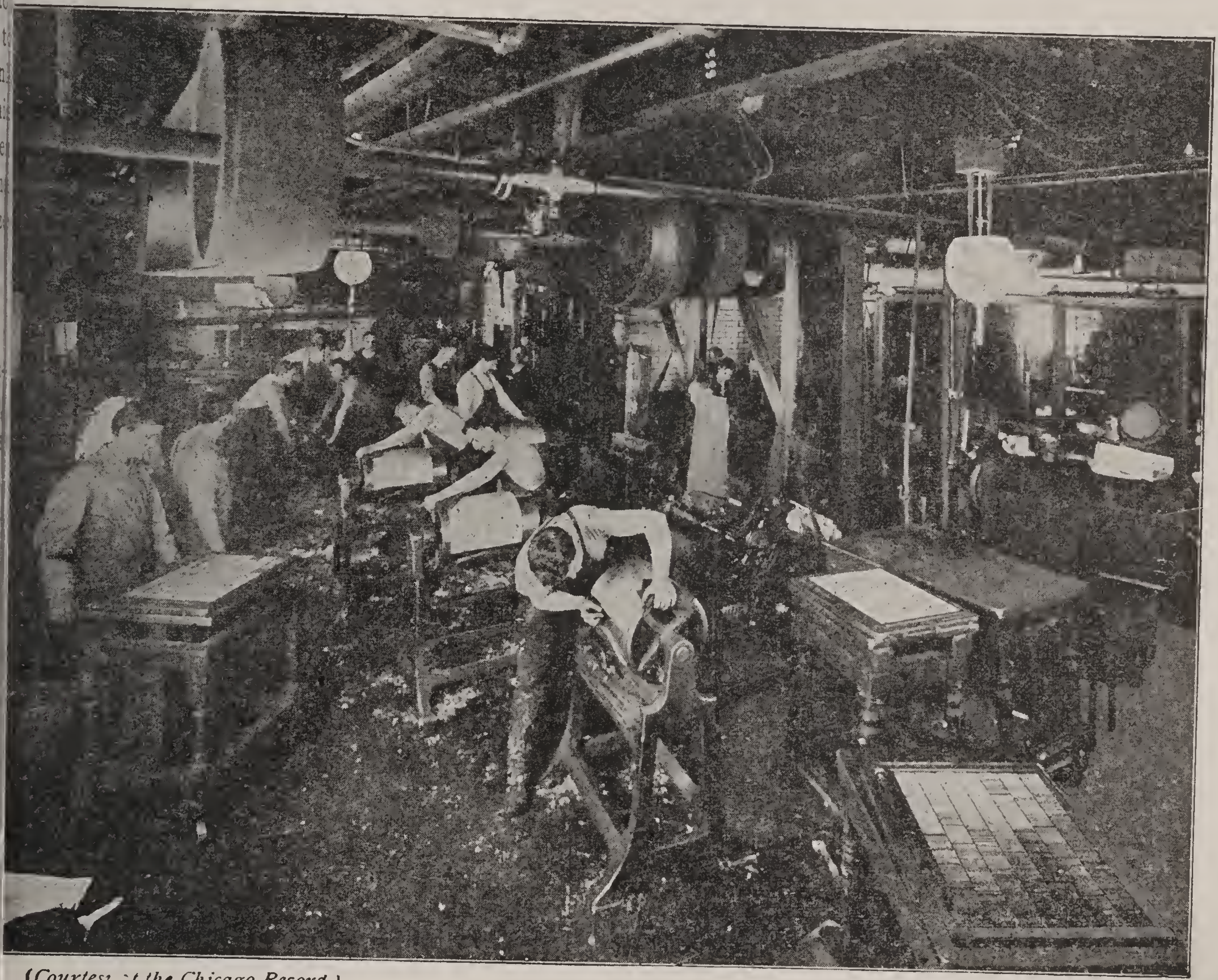
Zinc Etching

is the process generally employed in en graving illustrations for newspapers because of the rapidity with which cut made by this method may be turned out The first operation after the picture ha been drawn in black and white by the artist is to photograph it by means of a great camera on a "wet" plate. The camera and rack to which is fastened the picture when being photographed are both placed on a long board and hung by ropes or chains from the ceiling, a good deal after the manner of a painter's horizontal ladder hung by ropes from the roof of a house. This is done so that they will hold the same relative positions to each other, and if there is any jarring it will not affect the exposure. The exposures are generally made by the light of an electric arc lamp placed just back and to one side of the lens of the camera.

After a number of plates have thus been exposed, they are developed by ordinary photographic silver process. The use of "wet" plates is most important, for by this process the gelatine film which is wet may be stripped off from the lighter lass used in the camera and pasted on a eavier glass for printing, several pictures n one plate. This heavy plate glass is hen dried over a gas stove till the gela-ine is perfectly hard. Now a sheet of ensitized zinc is placed behind this late, and is exposed to an electric light, e same as one would print an ordinary otograph. The negative, being dark cept in the places where the black lines the drawing show in white lines, ad-ts light to the sensitive zinc only along se lines. The zinc plate is now taken the dark-room, where it is coated with and treated by a developing process that shows up the lines of the picture. After this there is a treatment of

Nitric Acid

that eats away the exposed surface of the zinc plate and leaves the inked lines standing out. The plate is then treated to a shower of red dust called "dragon's blood," which is burned into it by placing the plate on top of a hot gas stove. The plate would now be almost good enough to produce a fair impression, but acid and burning are repeated four times, once for each side of every line. Then the eaten-out portion is made still deeper



(Courtesy of the Chicago Record.)

STEREOTYPING ROOM OF A LARGE DAILY NEWSPAPER.

Showing the metal plates being prepared for the printing presses.

by the "routing" machine, which consists principally of a little drill-like tool, driven rapidly by electricity, which bores down and scrapes away such parts as are likely to blur in printing. After this process, the etching is ready to be mounted on a metal base and sent to the printing form.

Other methods such as half-tones and color-processes are used at times on newspapers, but for general work the above-described process is in the main adopted. The time used in preparing an illustration from the moment the artist returns to make his final drawing till the cut is placed in the form is often less than an hour.

The Linotype Machine.

One of the greatest machines ever invented is that which does away with the old method of setting type by hand, substituting instead a device that performs with mathematical precision every act necessary for typesetting except thinking. Ottomar Mergenthaler, an inventor who recently died a millionaire, brought about this revolution by inventing the "linotype" machine, which, as the name would indicate, sets automatically a "line o' type." This machine, which looks like a huge typewriter, has for its essential feature the "matrix," while the keyboard, triggers, rollers, pistons, elevators, sprocket wheels, and levers work with such accuracy that the line of "matrices" is carried down to the box for the molten metal, there is flooded by the metal, and then each separate matrix is carried back to its respective little box, waiting for the next tap on the keyboard that will call it into use again. The matrix is a mold of a particular letter made of sheet brass, and varying in thickness according to the width of that letter. If you were to press a type into some wax or putty, there would be the reverse of that letter; just so with the matrix. At the top is a V-shaped cut made up of little steps, a at the side of the matrix is the imprint the letter to be used. Each of the lite steps in the V plays an important part, they are different in each matrix, a after the line has been molded, the steps help in the automatic sorting of t matrices back to their proper places the magazine. The operator sits bef his keyboard something like the ty writer girl; he lightly taps a certain k and there at once drops down from t magazine and falls into place near t metal box the matrix of the particu letter wanted. The keyboard is laid the same as the type case of the old da the "lower case" or small letters bei on white keys, the "upper case" or ca itals on black, and the punctuation ma on blue keys; separate letters not mu used are kept in a little rack at the si and may be put in by hand. The "typ taps away on his keyboard until a b rings that tells him a line is complete He then pushes down a lever at his rig side, and the line of matrices is picked bodily, carried to a set of clam splashed over with hot metal, and th carried up by an elevating arm to the d tributing part at the top of the machi Here, by means of the little step-li grooves, each matrix is sorted out to proper compartment by a machine som what on the principle of a sieve.

The Distributing Bar

extends along the whole length of t magazine, which is fan-shaped a divided into tubes all ending at the bo tom in the little runway where t matrices come out. Beside the bar is long revolving screw, and as the row matrices come up from the elevating ar this screw pushes them along the ba In front of the compartment allotted f each letter is a special set of notches. As was said before, each letter has a set of little steps on the V-cut; these notches and steps agree for each particular letter, so that as the matrix of the letter "A" is carried along the distributing bar it can enter no compartment but that whose notches its little steps fit—just like the key that fits only one door.

(*Courtesy of the Chicago Record*)

FOUR O'CLOCK A. M.

A crowd of newsboys waiting for their papers.

Hot Type Metal

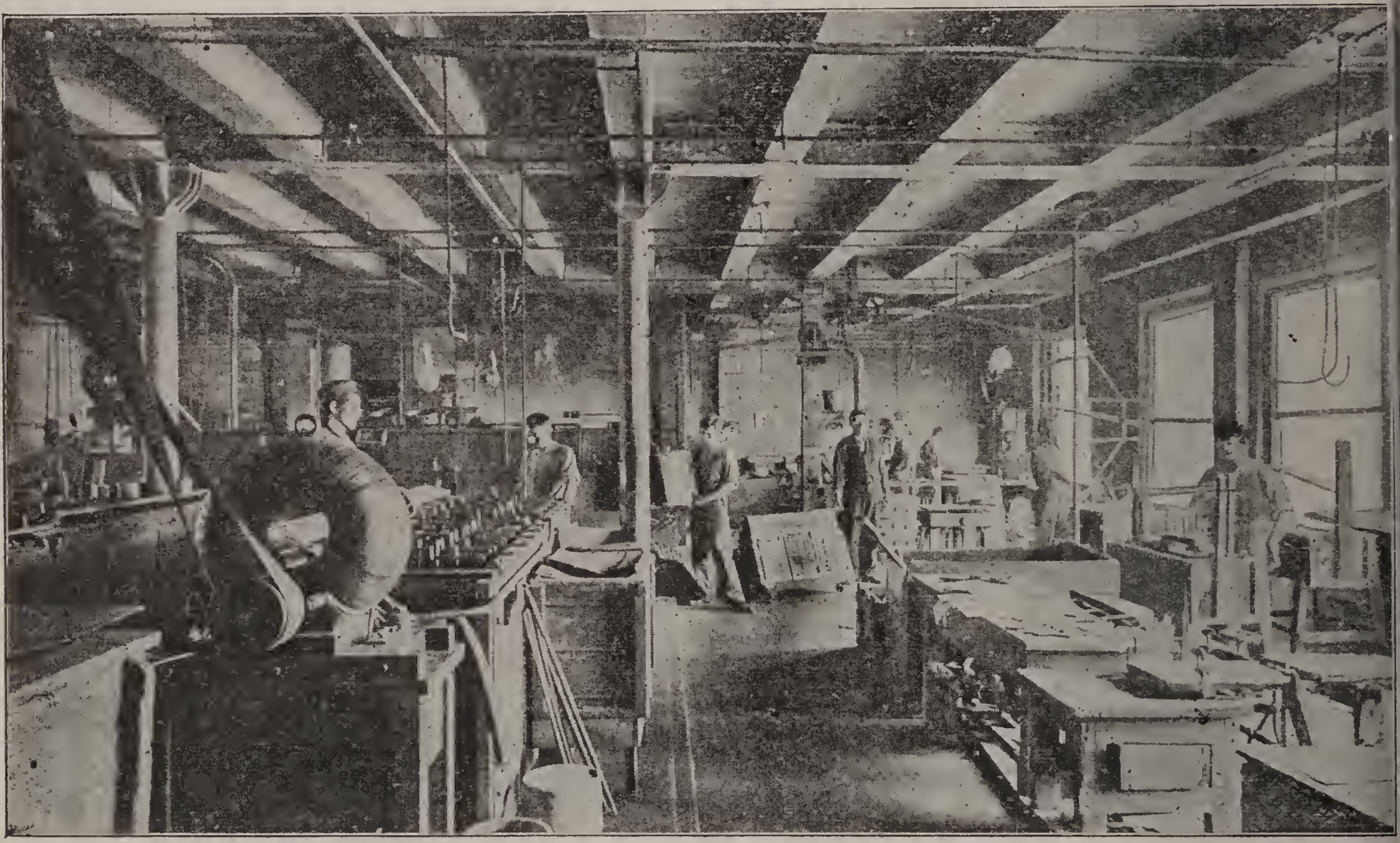
always kept in the metal box, heated by gas flame. Knives trim the edges of he molded line of type to the exact size ecessary. After the metal has been sed once it is again melted up for more pe. Typesetters can set as high as 000 ems, or matter to the amount of he newspaper column, in an hour, hereas it formerly took six hours. he 'em'' is the standard of type measrement; 100 ems is equal to the average 100 letters.) There are men who can set even 10,000 ems per hour. Mistakes, of course, occur as in setting by hand, and the proofreader must send the matter back to be corrected.

In setting

Large Advertisements

and headlines only is the old method of hand setting now used. This is necessitated by the use of large and odd-sized type. And still the "ad" room of a paper is not the least interesting part of its plant. Here, on nights preceding a great "bargain day" of some of the leading stores of the city, many men, expert in style of setting up fancy advertisements, are kept busy arranging the most attractive displays of type for the reader on the morrow.

After all the advertisements and articles are set up in type, they are sent to stone tables where men called "make-ups" see that each "ad" or story finds its proper position in large, square steel frames called "forms." In these the type is securely locked by screws so that the "form" may be sent down an elevator to the stereotyping room, where another process is gone through with before the press gets the work.



THE FOUNDRY.

To the left, the electric battery; to the right the men are making an impression of the type in wax and after the wax receives the coating of copper in the battery they take the copper shell and pour th metal into it—this is called casting.

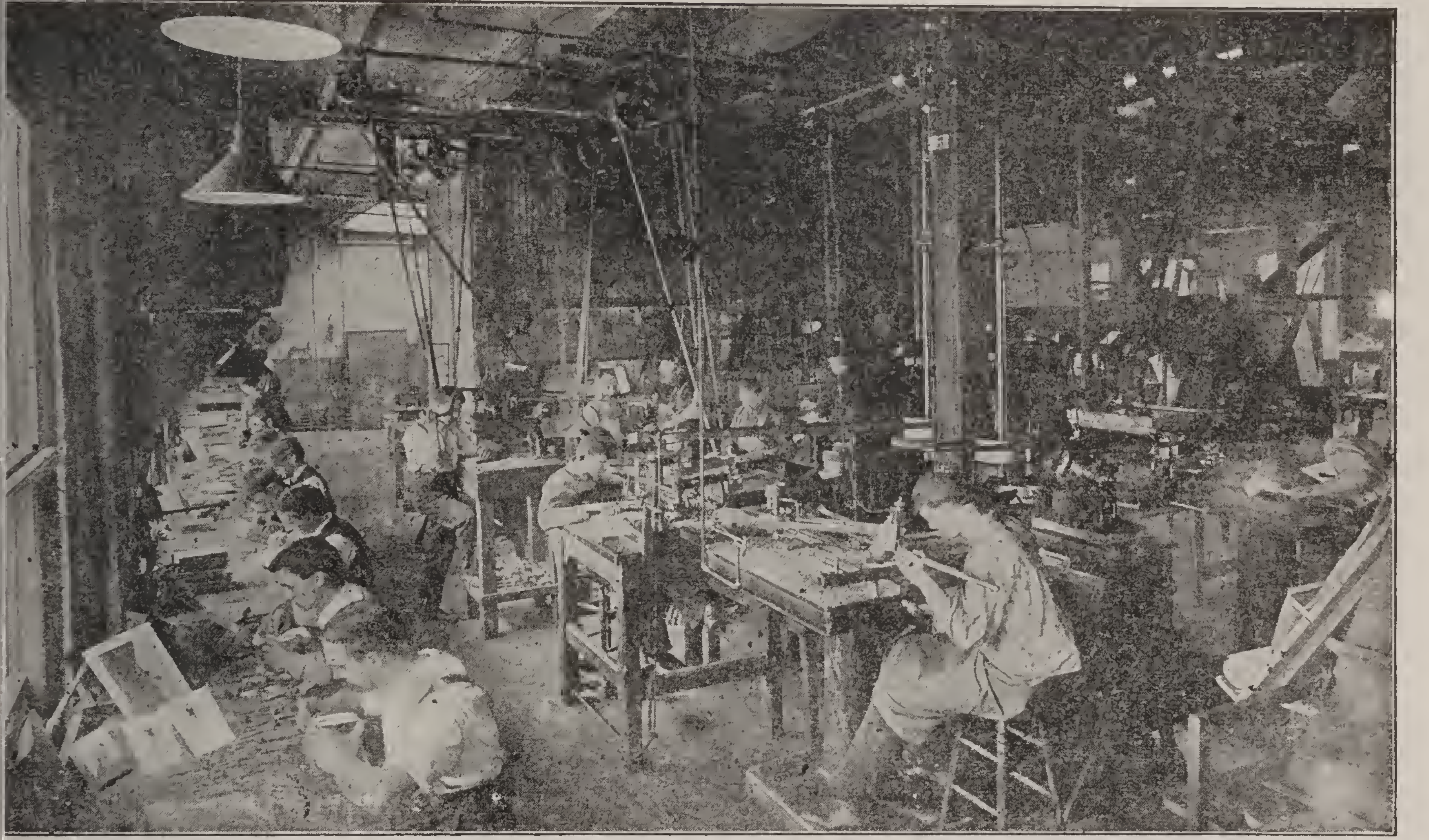
Time was when we printed by simply bringing a heavy weight to bear upon the flat surface of the paper spread on the inked type. That was when printing was done by hand. When the style improved and great cylinder presses came into use, type in its ordinary form would not do, but great circular molds had to be made that could be placed around the cylinders. This process is called

Stereotyping.

Each page is made up separately, an as the "chase" containing the typ reaches the stereotyping room on th elevator it is at once placed upon th steam table to dry, for the "make-up" ha used a wet sponge to dampen the typ and make each line stick against th other, to facilitate in handling. Fro the steam table, after the type is dry, the chase goes to a table where a "matrix' is made, only this matrix is not in brass, but in a sort of papier-mache. Sheets o tissue paper specially prepared are kept damp over night, and a sheet of this is now placed over the type. This is pressed into every little crack in the type and forms a reverse impression, which can easily be read. Then "backing" powder, onsisting of lime, flour and charcoal, is pread over the back and into the impresons, after which other paper is spread ver and the whole affair is covered with eavy blankets and shoved under a heavy ress heated by steam. Here it is lowed to remain until the paper has ecome hard and dry, when it forms a ght, almost fire-proof mold that can sily be bent into the shape of a half-linder. Then the matrix is placed in e

Casting-box,

ich is semi-cylindrical in form, consistg of two parts, one of which opens. e matrix is laid on the face of the sting-box, which bends it into the shape sired; the box is closed, the metal run and allowed partly to cool. While ll hot to the touch, men with heavy oves seize the cast plate and trim off the rough edges, and chisel out any imperfections. After this the plate is run under water to cool, and we have ready for the press a mass of metal the size of a page of a newspaper, seven-eighths of an inch thick, and curved exactly to fit the cylinder of the press.



ENGRAVING HALF-TONES.

the left of the picture are the finishers; to the right are the men that rout out the portion of the plate that isn't to print.

Monster Presses.

The Hoe press is possibly the largest and best of the monster printing machines of to-day. They are quadruple in form, and are so ingeniously arranged that they take in paper in enormous rolls on spindles on one side of the press, print the pages, paste the pages together, cut each paper off at the proper time from the rest that is being fed from the spindle, fold the papers, count them, and deliver them at the rate of 48,000 four, six, or eight page papers an hour, 24,000 ten, twelve, fourteen or sixteen page papers an hour, or 12,000 twenty, twenty-four or thirty-two page papers an hour. Each press needs floor space 22 feet long by 12 feet wide, and stands over nine feet high. The press is really two presses in one, paper being fed in from two rolls at a time, while the folder is really a separate machine connected and operated by the press. Each press has four 14-inch plate cylinders to which are attached by screws the stereotype plates. The cylinders revolve in the opposite direction to the impression roll, which is a heavy iron cylinder that presses against the plate and is covered with cloth. After a roll of

Hundreds of Pounds of Paper

is adjusted at the back of the press the paper web is run over a roller which smooths it out. Next it is grasped by the first impression roll, and it passes over the plate, receiving its first impression. Then the web runs downward to the second impression roll, where more is printed. Carrying tapes which guide the paper then run it up over the top of the press, where it is slit by a circular knife, and two wheels apply paste to the edges of the paper. Now the web is led to the folder over an angle-bar, and the mechanism is so perfect that the pages are all brought out in their proper position and the leaves cut. The other half of the press has been working in the same manner, either to make a complete paper like the other, or a supplement that is "stuffed" into the other part.

The Greatest Care

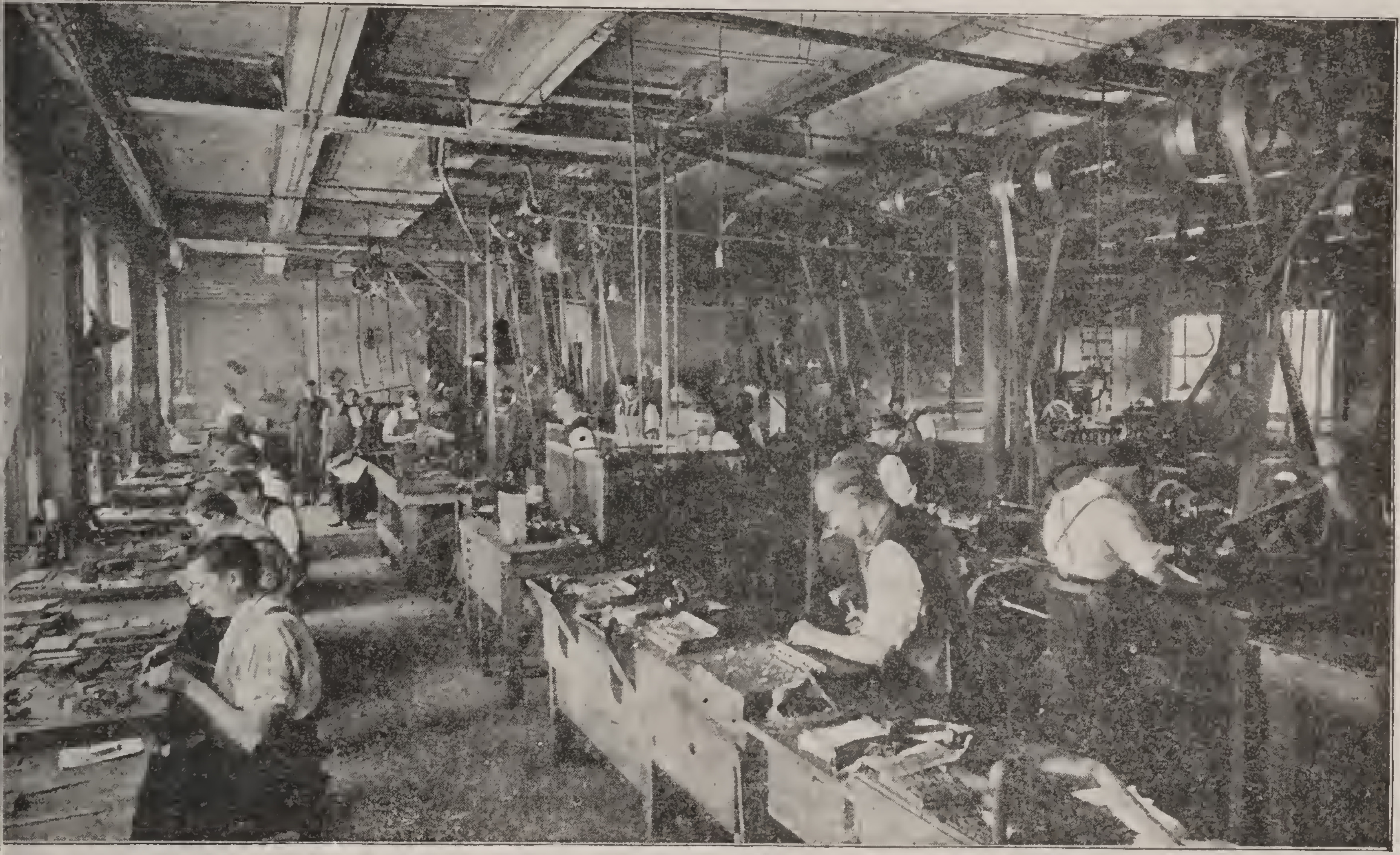
must be taken in operating the gigantic press, both to protect its delicate parts and the hands and legs of the men in attendance. One man holds a lever that starts and stops the press, others run about with oil-cans, lubricating eve part, while others see that the ink properly fed, and that the paper does n break or that a fresh supply is on han The cost of a Hoe press above describ is $40,000.

From the maw of this great giant t papers are run in on little electric troll cars to

The Mailing and Delivery Rooms.

In "newsboys' alley" has congregated crowd of urchins with their pennies reac to lay in a supply for their morning trad Each has bought a check from a cashi which bears upon it the number of pape to which he is entitled. With this chec he falls into line at the delivery windo and as his turn comes, he yells out th number. The man behind the windo rapidly counts out that number, takes h check, and throws the bundle of pape at him. So quick is the whole proce from writer to street boys that "hot news brought in at half-past two in th morning is in the hands of the early rise at four o'clock. But there is yet th subscriber living at a distance who mus be supplied with his particular mornin favorite. As soon as his name is enter on the subscription list, this list is sent t the printer, who sets it up in type. Fro this is printed upon long strips of yello paper the names of every subscriber wh is to receive a paper by mail. The printing includes with each name the post office and street address, together wit date of expiration of the subscription These strips are set into still larger strips and sometimes pasted together, so tha by a clever little device called a "mailing" machine, in the hands of skilled "mailers," each little label is carefully gummed cut off from the strip, and with a slap i pasted on the outside of the paper, thu telling the postmasters its destination.

'his process is, however, only for the ngle subscribers; for the dealers there ave been prepared early the evening efore large wrappers with their proper bels for sending, together with the umber of papers to be sent, plainly arked on the outside. So when the me comes for wrapping, each mailer can pidly count out the desired number, pply paste to a number of wrappers at ce, hurriedly roll up the bundle and row it into the sack for a particular ain.



THE FINISHING DEPARTMENT OF AN ELECTROTYPE FOUNDRY.

All the "galleys" of printed lists of bscribers and dealers out of town ve been arranged in geographical der, that is, all those going to one town e on the same list. This greatly aids sending out to the trains, for as soon one strip is done, that bunch of pers is put in a bag ready for that wn or train.

Business Departments

of the newspaper are where all other details are thought out. Advertising must be obtained which will bring in money to support the plant and make money for its owners. Schemes must be worked out to induce customers to buy this particular paper instead of some competitor. Enormous contracts for buildings and machinery must be let; new devices developed that will increase the reputation of the paper; correspondents abroad hired and paid; press associations formed with other papers for the protection of their general interests. And when one stops to consider how vast are some of the American journals, with several issues each day, and great magazine-like editions on Sunday, with circulations that run nearly to a half million copies daily, the nature of such stupendous business enterprises may be imagined.

Death-Dealing Machines of War

HOW THE ARMIES AND NAVIES OF THE WORLD FIGHT TO-DAY AS COMPARED WITH METHODS USED ONE HUNDRED YEARS AGO.

Huge Floating Arsenals; Shells Fired Eight Miles; Smokeless Powder; Torpedoes and Submarine Mines.

IT has been said that improvements in deadly war missiles will before long put a stop to war altogether. One would almost think so when it is considered what marvelous strides invention has taken along this line. Time was, and not long ago either, when the round cannon shot was aimed at the tough oak side of the frigate; when the grappling chain and cutlass for hand-to-hand conflicts were necessary on all war vessels, and the bayonet and cavalry charge played great parts in land battles. Most of this is now changed. The iron shot gave way to steel projectiles, as the wooden hulls were replaced with steel. The completeness of victories, however, is no less than in centuries past; distances are only greater. And each increase in the power of improved explosives and projectiles will be met with greater defensive devices, and with greater distances between the firing lines. It will be the brotherhood of man, not the deadliness and fear of weapons, that will bring about universal peace.

To-day, in land forces there are such improvements as the far-reaching rifle, with its nickel-capped bullets, the Gatling, Maxim and Hotchkiss guns, smokeless powders, and such explosives as cordite, dynamite, lyddite and nitro-glycerine. Charges play some part, as in the gallant fight of San Juan Hill, but, in the main, artillery and long-distance firing prevail. With the navy more marvelous impro ments have been made. Nearly eve thing on board ship can now be operated electricity. Ships are lighted, torpedo guns and mines fired, searchlights operated, torpedo-boats propelled, and hundred other devices all controlled this weird agent.

The armor plates of the modern ves are thick and of the hardest steel know yet they are readily pierced by the en mous shells thrown at the distance several miles from the throats of gre dynamite and compressed air gur Among the numerous

Explosives of High Power

that are coming into use, the newest a possibly the most powerful is lyddit Like others of its class, such as dynamit melinite, cordite, maxinite, etc., it picric acid brought into a dense state fusion. Picric is obtained by the actic of nitric acid on carbolic acid. Whe lyddite shells explode they grind the outer coverings into small fragments, ar with a noise like the downfall of tl heavens, tear everything to pieces f yards around. This explosive is bein used now by the English in the war wi the Boers, though the latter have con plained that such is against the codes civilized warfare. General Kitchene also used it in his campaign of the So dan with tremendous effect. A shell wa dropped into a mosque at Omdurmar here 120 Mahdists were worshiping. he mosque and its inmates were

Blown Into Pieces,

d only twelve of the worshipers caped alive. In the war between China d Japan, cordite, a similar though in- rior explosive, was thrown in a twelve- ch shell into the Japanese flagship atsushima with the effect of hurling a 7-inch gun from its mounting, firing a ap of ammunition, disabling two more 7-inch guns, and killing and wounding nety officers and men.

Smokeless powder is another deadly ex- osive, having for its main peculiarity e quality of exploding without smoke, ving off only a slight violet vapor, that not sufficient to betray the ambush of e gun. This kind of powder is made in ng cylindrical strings and then cut up to small pieces. In the United States ar supply factories, it is coated with umbago by being placed in receptacles ith the powdered black lead or plum- igo and shaken up. This coating, being ther oily, keeps the powder from ignit- g by friction in case of rough handling. rdite looks a great deal as its name ould signify, something like brown jelly essed into long strings from one-six- enth to one-half inch in diameter, and ied. Some kinds of smokeless powder ok for all the world like carefully cut rips of slippery elm bark. It is made in abs about one-fourth inch thick and a ot and a half to two feet long. This wder is much safer to handle than com- on black or brown powder, and will bear uite a blow provided no sparks are ruck. Like all smokeless powder, it ill burn without special danger if a atch is applied to it, with a clear, steady ame, not flashing with a big s-s-s-s like e old sort. Some of these explosives re cut into pieces just like Saratoga hips, and it is a rather blood-curdling job for one not informed to watch shell-loaders hammer home this stuff into the big shells as though in truth it were only so much potato.

Nitro-Glycerine,

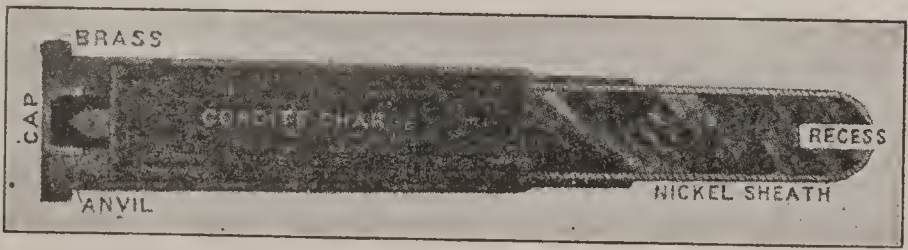
which is used in some of its forms for war purposes, but more especially for blasting oil-wells and the like, is one of the most difficult of all explosives to manufacture. It is generally pale yellow in color, is odorless, and has a sweet, pungent taste, though when touched to the skin will cause severe headache. It is made in a large tank called an agitator, which has a set of revolving paddles. Into this are poured equal quantities of nitric and sulphuric acids, and after a mixture of 250 pounds is secured, sweet glycerine to the amount of 1,500 pounds is added. The chemicals naturally tend to come to great heat, but since ninety degrees explodes the mixture, water pipes are arranged about the vat to keep down the temperature. In carrying this explosive there is great danger of jarring. Makers of the stuff generally live only about five years at their work. As in all other factories of powders and the like, no metals are allowed, and the shoes and clothing of the workmen must be changed to suit their employment. Canvas shoes are used, and the men may not turn their trousers at the bottom for fear of bringing in grit and gravel that might strike a spark.

Projectiles

have improved in weight and hardness so that now in battles tons of metal are fired through great granite fortifications and steel clad ships with greater ease than the old-time round shot could pierce an oak side. Early in the present century methods for throwing hollow shells filled with powder or small shot were invented. From canister, grape and chain shot, there have evolved heavier shells, generally explosive, but also of such hard and sharply pointed steel that no armor can withstand them. Most of the smaller rifles are equipped with balls that pierce the object aimed at cleanly and without jagged edges. Cases have been known where such a ball passing through a person did not even inflict a severe wound. Such is really the result aimed at in civilized war; either to kill a man outright, or simply temporarily to disable him. Some kinds of shells, however, are diabolical in their intent. Among these is the

Dum-dum Bullet

recently declared barbarous by the Peace Convention at The Hague. Some small shot explode after entering the body; others, like the dum-dum bullet, flatten out when they strike any object of resistance, because of their soft material, being only partly covered by a nickel envelope, and these at once make fearful, jagged wounds, and are hard to extract. The British are now using in South Africa an awful affair partly covered with copper, but bare at the end, and with a slight opening sawed down into the bullet. When this strikes a victim, the cut closes because of its softness, and the bullet then assumes the shape of a mushroom, as a result making terrible and painful wounds. One of the new inventions along the line of projectiles is what is called



THE ENGLISH DUM-DUM BULLET.

The recess in the point of the bullet allows the soft lead, of which the interior of the bullet is made, to expand on striking the victim's body; while the nickel sheath breaks into jagged edges and makes frightful wounds.

The "Base" Shell.

The bottom or blunt end of the sh which is large and for cannon use, i separate from the rest of the shell. Th "base" rests on ball-bearings, and, w the upper portion revolves, it is stati ary. Attached to the base and fold up into grooves along the upper part four murderous scythes. When the sh is thrown from its gun, the rifling of core starts the point of the shell revo ing, the knives, pushed by springs, ju out from the sides of the base, and they go through the ranks of the ene cut and maim every man in their cour Then, after its work is nearly complete, explodes and works more havoc. T knives when outspread cover a diamet of forty-five inches, and it may be ima ined what carnage such a missile will cr ate in a rank of closely lined infantry.

Searchlights

have brought about a great revolution warfare. By their means lights and si nals can be thrown many miles, and th work of the enemy in the night detecte The average searchlight is made up lenses and reflectors so as to condense diffuse the light of a 25,000 candle-powe electric arc lamp. They are made in th shape of a cylinder about thirty inche deep and from two to three feet in diam eter. In the back is a silver-backed re flecting lens, and at the front is a glas door. Within is an electric lamp placed at the focusing point of the lens. Between the glass door and the lamp is a smaller reflecting lens that throws the light of the electric lamp into the large lens, and that lens in turn throws the concentrated rays out through the glass door miles and miles into the night. The whole affair is mounted on a pedestal, and can be moved in any direction at will. The rays of light are generally kept together so that a beam 3,000 feet away vers only the width of fifty feet. This, wever, can be changed at will if de- ed.

Torpedoes

e the dread of all war vessels, and work much havoc as any other weapon. hey are shaped like a cigar, with pro- ller at the rear and an awful load of namite or gun-cotton at the nose. In- le is an electric storage battery attached a motor that operates the propeller. hen ready to be discharged at the emy, a torpedo is placed in a com- essed-air device that shoots it out into e water, aimed in a certain direction. he electric battery has been turned on d the rudders so arranged that the tor- do will travel in a given angle. It ives forward at a great speed, the cap the nose strikes the side of the ship d discharges the explosive, and the ship torn into pieces.

Mines are used nowadays for protection the harbors against an incoming emy. These are big bombs placed at e bottom of the harbor or straits and nnected by electricity so that they may fired off at will. Charts are made of e harbor, and so figured out that the endant several miles away can look rough a telescope at the approaching emy, and can tell at just what moment e intruder is over a given mine. He en turns a switch, and the great vessel steel and iron is blown into the air with vast volume of water, and rapidly sinks. me mines are fast to buoys which float the surface, so that when a vessel com- g into the forbidden waters strikes one, electric spark is carried down to the ne and it explodes.

Among

Machine Guns

e Gatling, Hotchkiss and Maxim are the adliest because of their rapid fire. The tling has a number of barrels joined together side by side, and at a distance looks like a big stubby cannon. There are generally about ten barrels, which revolve upon a pivot. Each chamber has a separate lock which is discharged automatically when the barrel reaches its proper position. The machine is worked by a crank; the cartridges are placed in a rack with grooves that let them slide down into their proper chambers as soon as the fired shells have been ejected. As many as 1,200 shots a minute have been fired by the Gatling gun.

The Maxim differs in that it is wholly automatic; after each recoil of a previous discharge the shock opens the breech, extracts the empty shell, takes a fresh cartridge, cocks the gun, pushes the shell into its chamber and fires the gun. The cartridges are loaded into the gun in a belt, and all the operator has to do is to pull the trigger the first time, and the belt is ground through the machine at the rate of 600 shots a minute.

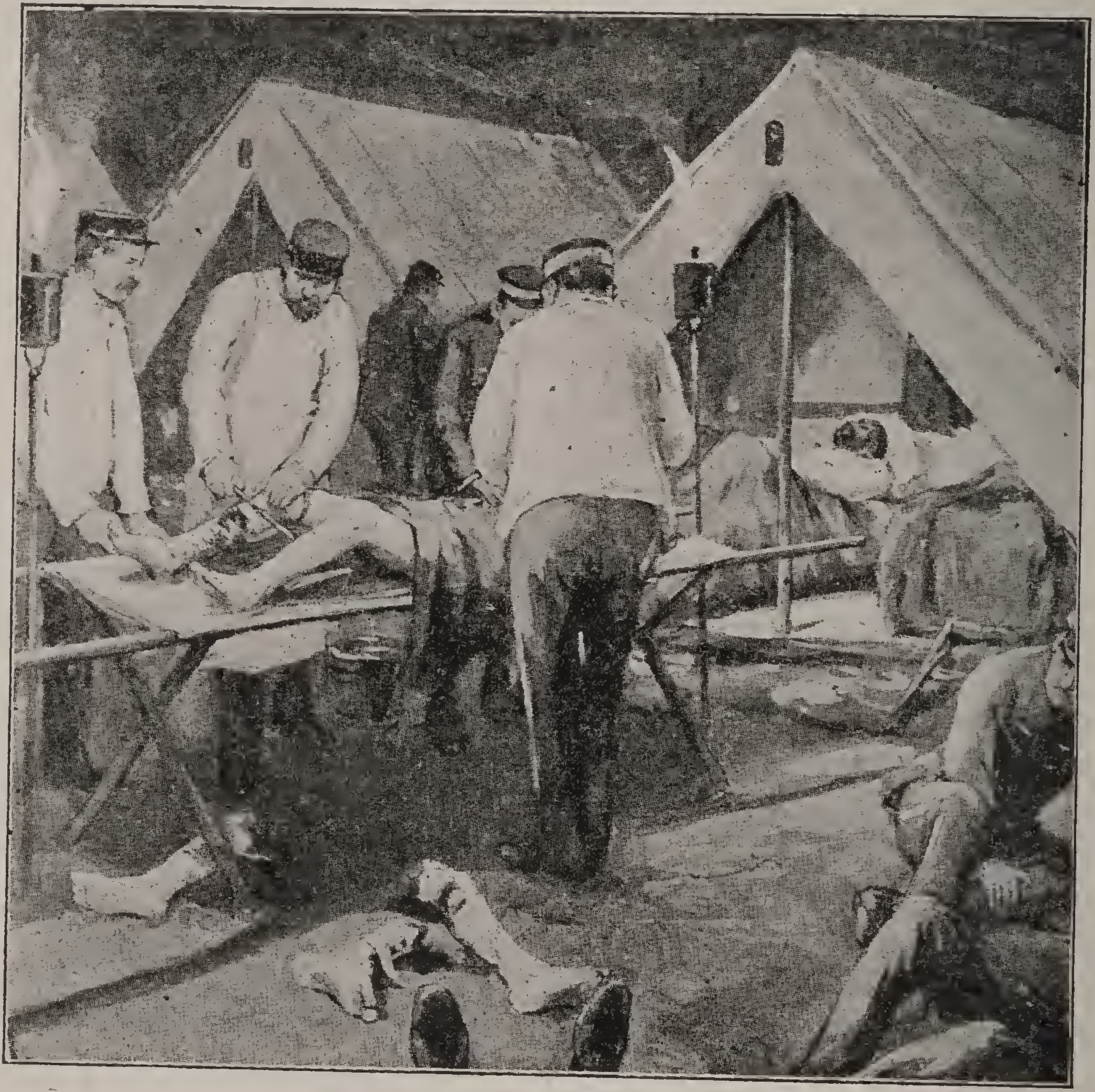
The Armstrong gun is the largest of the rapid-fire guns. It is for large caliber shells, using 4½ pounds of smokeless powder, and throwing six-inch projectiles weighing 100 pounds with enough force to penetrate fifteen inches of wrought iron. A smaller gun of the same order fires forty-five pound shells at the rate of fifteen per minute.

The Driggs-Schroeder and Hotchkiss rapid-fire guns are inventions of Americans, and are used largely on our battle ships, especially in the "fighting tops." These swing on pivots, so that they may be directed to any quarter. They fire one shot at a time, and to aim the gun an arm-piece similar to that of a rifle is attached. The gunner presses this against his shoulder and steadies it, while his two hands remain free to open the chamber, insert a shell, pull the trigger, and reload. It fires still projectiles with great force and at the rate of thirty-six shots a minute.

Enormous strides have been made in the upbuilding of the

American Navy

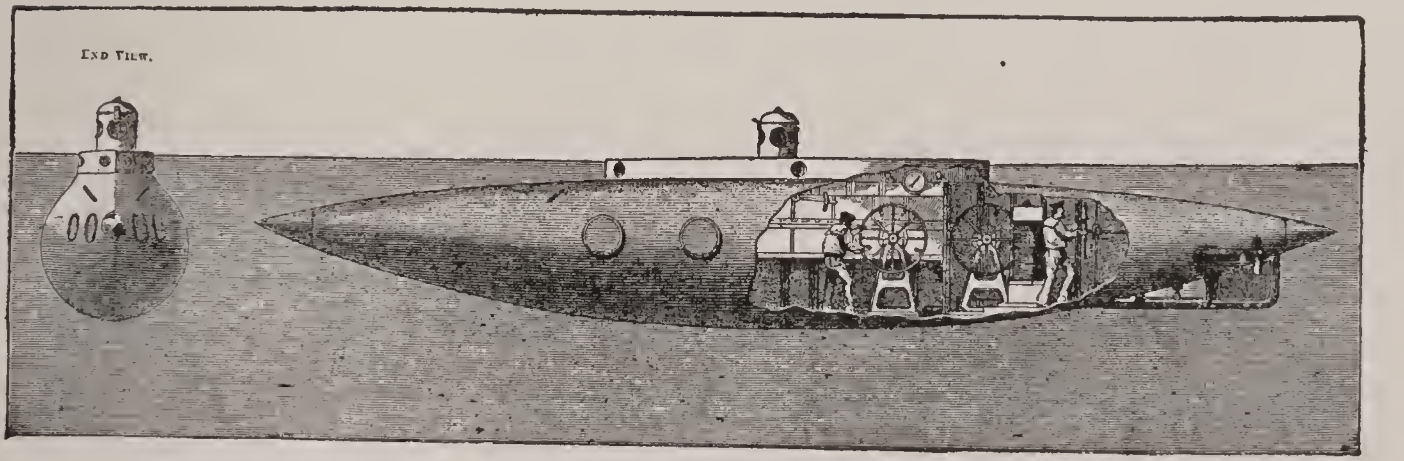
since the Spanish-American war. Many new craft have been added, but in the battleship class the effectiveness of our fighting ships has been prodigiously increased. Six new monsters of the finest type are under way: the Kearsarge, Kentucky, Alabama, Illinois, Wisconsin, and the new Maine. The measurements of the Kearsarge and Kentucky are: Water-line length, 368 feet; displacement, 11,525 tons; speed, 16 knots; horse power, 10,000; water-line armor belt, 16½ inches; side armor above belt, 6 inc turret armor, 17 and 15 inches; conn tower, 10 inches; protective deck, inches. Armament: Main battery, 4 ti teen-inch guns; submain battery, 4 eig inch guns; secondary battery, 14 f inch rapid-fire guns, and 20 six-pou rapid-fire guns. The enormous pro tiles thrown from the main-battery gun weigh 1,100 pounds, leave the muzzl with 33,627 foot tons energy, and hav the power of penetrating 34½ inches o wrought iron.



CARING FOR THE WOUNDED.
A scene in a modern U. S. field hospital during the late war with Spain.

Besides the heavy war vessels, the navy is being equipped with a new class of peace ships. Six cruisers are soon to be built that are not intended for battle with war ships of the enemy. Their duties lie in capturing or annoying the chantmen and unprotected harbor ns of the enemy, and policing the sea. y are especially adapted to tropical ers, carry plenty of coal, and are light ugh to enter shallow water. They to be built of steel, but their bottoms sides up to a minimum of two feet ve the water line are to be sheathed heavy planking, which in turn is to covered with copper. This copper ring is to avoid barnacles and the which grow on the bottoms and sides, materially hamper marine move- ts. Very little wood is to be used on vessels, for it has been found that king beams splinter and cause more nds than bullets. They will measure feet 2 inches over all, 53 feet wide; draft when loaded, 16 feet 8 inches; lacement, 3,400 tons; horse power, 4,500; coal capacity, 700 tons, and speed 16½ knots. All the latest methods of electric lighting, heavy engines and the like will enable them to carry crews of 290 men 9,800 miles without other supply.

The Largest Searchlight ever made is the one that was exhibited on the roof of the Manufactures Building at the World's Columbian Exposition, and which is now installed in the observatory on the summit of Mt. Lowe, California. It has the power of 3,000,000 candles and throws a strong light 150 miles. Its reflecting lens weighs 800 pounds, is three-fourths of an inch thick at the edges and one-sixteenth in the center, and is encased in metal rings weighing 750 pounds. The whole light is 11 feet high and weighs 6,000 pounds, yet is so delicately poised that a child can move it in any direction.



SUBMARINE BOAT WORKING BY ELECTRIC POWER

"SKYSCRAPERS."

THE MODERN PUEBLO VILLAGE; WHOLE TOWNS IN THE TALL BUILDING OF TO-DAY.

TEN years ago, when the first "skyscraper," the Tacoma building, was begun in Chicago, it was supposed that the Pyramids and a few of the great cathedrals were the largest buildings that were likely ever to be erected. To-day we have tall bridge-like edifices that almost overtop these landmarks and seem to brush the skies. The development of the tall building generally known as the "skyscraper" came about in the natural course of improvements in building, but it has wrought one of the greatest revolutions, though peaceful, that has ever been witnessed.

When land values in the great cities began to go up several figures at a jump, the question was asked, "Where are we going to conduct our business?" Land was occupied in the mercantile centers, and since the buildings could not spread out they must increase in height. This went on in a meager sort of way, for people did not like climbing up several stories to their offices. Then came the elevator, and with it the study of how best to increase the height of the office buildings.

It had always been supposed that the walls were the main support for the floors and the rest of the structure, but one day an engineer came along who reversed this method. He argued that by making the framework of steel and fastened together like a cantilever bridge, there ought to be strength enough to support the out covering. And such has been the met of building since, called

"Chicago Construction."

But the problem was not nearly wor out, for with increased height there m be increased strength in the foundati This meant a study of the soil to see would bear such great weights, and w would be the best method of keeping structure from leaning out of plu The result has been that building now become almost a branch of c engineering.

Let us observe the rearing of one these cities in miniature, with its railw like elevators carrying thousands of p sengers and freight daily, with its o electric light and power plants, its rest rants and hotels, its libraries for tenants, its telephone "central" and te graph lines, its laundries, fire appara and trained fire departments, bar shops, postoffices, superintendents, tectives, and corps of workmen.

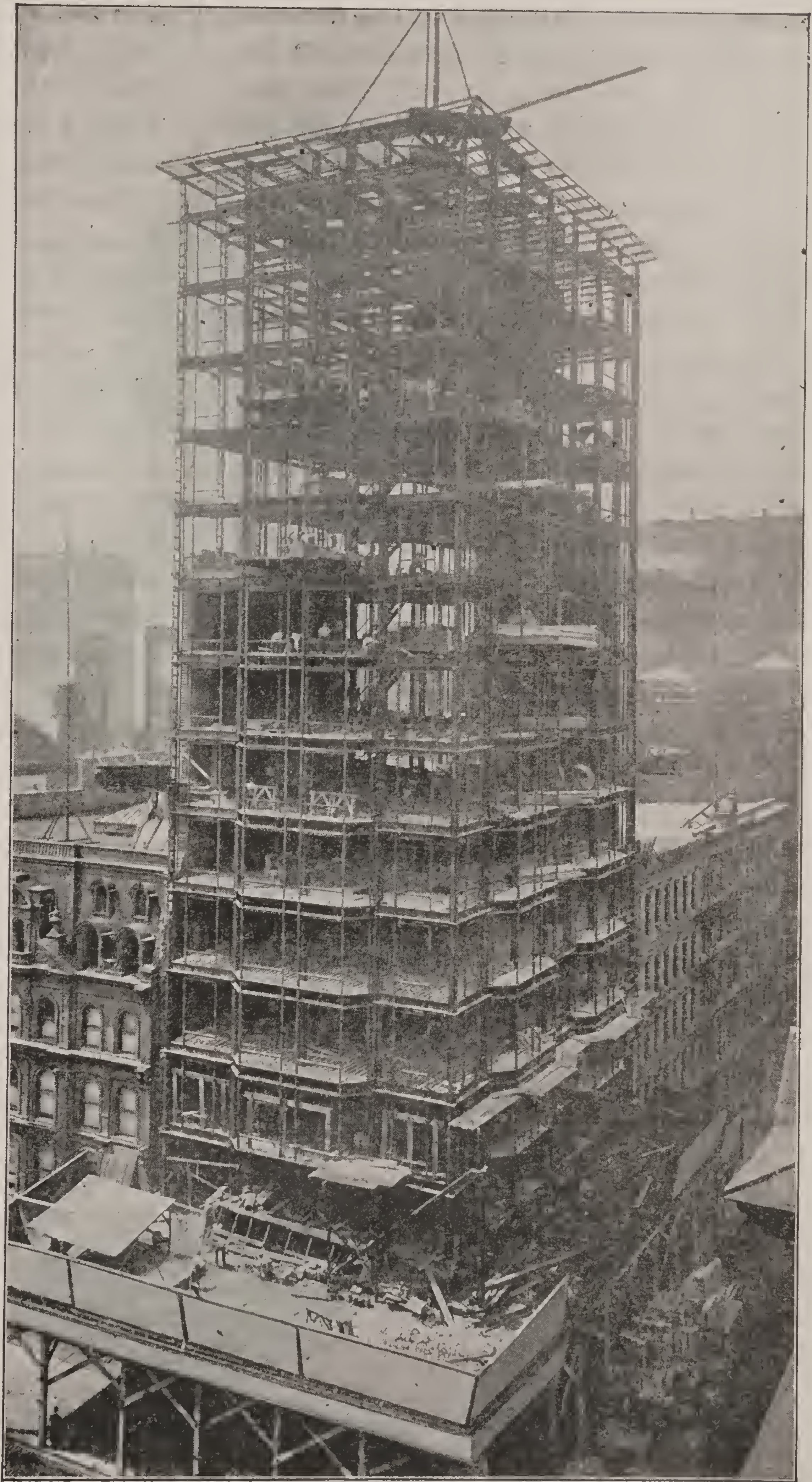
The Tallest Building

of to-day is the Park Row, in New Y city, designed by R. H. Robertson. I twenty-nine stories in height and me ures from the bottom of its foundation the top of its flag pole 501 feet, or nea one-tenth of a mile. Its weight is ab 20,000 tons, and when loaded with "live" weight of tenants, furniture, et the total pressure upon the found les is about 61,400 tons. It may well be agined what is the amount of steel, one, bricks, cement, glass, etc., that is eeded in the construction of such a onster, and yet the rapidity ith which these buildings e erected is still more nazing.

First the soil is probed to e of what nature it is. In hicago,—which, by the way, almost a floating city beause of the thin crust of rth that rests on a large ed of ooze,—the building roblem is different from at in New York, where the round is largely sandy with ck bottom.

Great Pile-Drivers

ith hundred-ton hammers, ound down into the ground great depths long pine les, sometimes, as in the ark Row building, forty feet ng, and as many as 1,200 number. The piles are aced about two feet apart d in rows that will be diectly under the great vercal columns that are to pport the great weight of e completed building. On p of these piles and about eir upper ends is poured ncrete, which hardens and ecomes a solid rock-like subance, resting securely upon e piles. Sometimes criss-oss arrangements of steel ils are imbedded in the ncrete, and, when it has ardened, there is presented a first foundation a mass steel and rock that it would seem no force or time could conquer. Resting on this sub-foundation are huge blocks of granite, and above them the brick piers of the building. The weight of



A MODERN "SKYSCRAPER."
Showing the framework up, and several floors laid. Ready to put on the walls of the lower stories.

the building is not allowed to come directly on the granite, but huge steel beams, some of them eight by fifty feet, and weighing more than fifty tons, are placed between the foundations and the bases of the upright steel girders about which the "skyscraper" is to be built. This distributes the weight to every part of the foundation. Above the surface a great steel framework rises, which, before the walls are on, looks a great deal like an immense house of cards.

The enormous steel girders that make up the frame are all riveted together in every available place. It is said that if a storm great enough to disturb one of these skyscrapers came along the building would hang together, even if it were blown entirely over. The outer walls of this great box-like frame are very thin when compared to its height. If the old method of using the walls as support for the floors were used, the walls at the bottom would have to be so thick that there would be no open space for use, while the weight would be so great that no foundation would support it. The material varies; often it is of terra cotta, and sometimes of brick and stone. It is fastened securely upon the framework, and the lower walls give but little support to those above.

The floors are made, as are also walls, entirely of hollow,

Fireproof Brick;

and some buildings have not even wooc laths, but rather arrangements of tl steel or tin upon which the plaster is la Thus a fire may burn out the fittings one room, yet not spread to another.

The cost of the Park Row building w $2,400,000, but the income from its rer is more every year than the taxes of small city. It contains 950 rooms, a will accommodate tens of thousands people. The elevators carry over 50,o people daily.

The question whether the "skyscraper has reached its limit is not as y answered. Cities are enacting buildir laws regulating the height of building Fires disastrous in their results hav recently broken out in New York, whic threatens the increase of height. It r mains to be seen whether steel will las long enough without rusting, though a present, examinations of steel girder erected ten years ago show no suc decay. Whatever the future of the tal buildings is, all modern improvements i buildings take on the aspect of the "sky scraper."

Compressed Air and Pneumatic Tubes.

HOW MAIL AND EXPRESS PACKAGES ARE SENT MILES UNDERGROUND BY AIR ALONE.

AIR compressed into a smaller space than it normally occupies exerts a powerful pressure, for being a gas of a ertain density it needs a certain amount room. When, then, by means of a ompressor or pump we force air into a nall receiver the tendency is for the tiny oms that make it up to push one against e other for more room and try to get way. This powerful agent is easily tained, and when stored up in tanks ay be used in any one of some hundreds ways. When conducted through a pe with a faucet nozzle the air may be sed for blowing dust out of carpets and pholstery, as well as for applying paint high ceilings. Chemical experiments e made daily with its aid. Power is plied for running cars, elevators, autoobiles, electric dynamos, and many her such affairs. Liquid air was disvered only by its aid, and the great stem of sending packages in pneumatic bes from floor to floor of the great deartment stores, mail from city to city, d messages underground from the great ess associations to the newspapers, ves much time and expense. Recently pneumatic tube system was opened beeen the New York City postoffice in e city hall at New York with that of ooklyn. A tube eight inches in diameter and over a half-mile long passing over the Brooklyn Bridge thus hourly saves the use of many wagons and messengers. Possibly as fine a system as any is that which was recently installed in the Waldorf-Astoria Hotel in New York City, though the placing of the tubes in the walls of the building is a great deal easier than running them under the ground in conduits, as are those that connect all the great newspaper offices with the telegraph companies.

This great hotel has 1,200 rooms, and on an average entertains 1,500 guests; it is sixteen floors high, so that it may readily be seen what an army of pages and clerks it would take to sort and deliver 6,000 pieces of mail and 2,000 newspapers that are received every day, without the aid of some such device as its pneumatic tube system. In the basement of the hotel is a

Pump-Like Engine

that compresses the air to a pressure of from two to three pounds to the square inch. The compressed air is stored in a large tank, from which run two large mains or pipes, one to the "central" station on the main floor, where the boxes are shot up to the different floors, and another that leads up to the top of the building. The latter has fourteen branches, one leading to each of the first fourteen floors, each one ending in receivers specially adapted to the system. These two mains and their branches supply air under pressure to the other tubes that are to carry the messages. Now, leading from each station on the upper floors down to the "central" on the main floor are separate transmission tubes made of seamless brass tubing three inches in diameter, which do the carrying. Thus, at the main station there is a long row of receivers, fourteen in all, each numbered and leading to its respective floor. Little boxes to fit the tubing, and having fur on the ends so as not to stand still and let the air pass around them when in the tube, are employed to shoot through these pipes, while longer ones ten inches in length are used for carrying newspapers. When it is desired to send up mail or a visitor's card to an occupant on an upper floor attendant at "central" places the mess in one of the boxes, shoves the box i the receiver, and then pushes a rod wh in turn actuates machinery that lets little air into the tube. This causes a c rent sufficient to carry the box up to t end of its tube, where it is dumped o The attendant at this station hands t message to a page in waiting, who carr it to the proper room.

Some systems have two sets of pip through which all the time there is flo ing a strong current of air, one pipe lea ing up, the other down. This, howev is done away with by the system ju described, one tube sufficing for messag either way. On election nights wh newspapers are rushed to get the new and thousands of telegrams are bei sent and received hourly, this is the on method which could be used.

Modern Illustrating.

HALF-TONE AND COLORTYPE ENGRAVING.

ASIDE from the method known as zinc-etching (see article on Modern Newspaper) there are several other processes, such as wood-cuts, half-tones and colortypes. Wood-cuts, as their name implies, are engravings on blocks of wood, and are of the earlier method of engraving. With these very fine detail in lights and shadows can be obtained, but for rapid and inexpensive work the photo-engravin processes are used in the main. The zin method for outline cuts, or cuts wher there are no other tones or colors othe than black with the blank space white is as good a process as could be desired but it can readily be noticed that in reproducing photographs there are some shadows more intense than others and som lights brighter. Zinc etching canno

ssibly bring out anything but white
l black, so the half-tones or lighter
.dows had to be produced by some
er method.

t was found that by photographing the
ject desired through a fine screen of
islin or

Wire Gauze

lines scratched on a glass plate and
n filled up with ink, the little squares
he screen would separate the rays of
ht according to the strength of the light
shadow of the picture. Where the
.dows are intense the rays run together
that the effect on the plate is of the
ck shadow running all together, but
ere they are lighter the rays come
on the plate differently and form little
s, while in the high lights or white
ces the plate is still more dotted. If
will take a magnifying glass and
.mine a half-tone you will see that the
ole picture is made up of little cross-
rs. This is the effect of the screen, and
alled "stippling." The screen is placed
t in front of the plate to be photo-
phed upon in the camera, and as the
s of light come in through the lens
y are diffused according to the inten-
of the light or shadows in the object
ng photographed. The screen is ruled
ittle bars with lines from 80 to 150 to
inch. These are so small that they
dly appear as lines when the cut is
wed a little ways off, yet they accom-
h the work of collecting the different
des of half-tones, and produce a pic-
e after being etched on copper or brass
tes almost a counterpart of the photo-
ph.

The Colortype

vorked out on the same line, that is,
h a screen to stipple or grain the plate,
a further process of using different
ored inks is used which in the end gives the effect of photographs in color. The process consists in having three different half-tone plates made of the same subject, which are used respectively with three different inks: red, yellow, and blue. These three colors when combined in proper amounts by printing one on top of the other will give any shade of color desired. The subject to be printed is carefully studied as to its color, and the proper combination of the inks to produce the desired colors is decided. Then one plate is arranged for printing, let us say, in blue. All that portion of the picture that is to appear in heavy blue has a heavy surface on the engraving; the lighter shades are stippled more, or eaten out; while that portion which needs blue in combination with one or both of the other colors is shaded in proportion. This plate, after being "blocked" with color thus, is marked near the edges with

"Register Marks"

which aid in printing the next color exactly on top of the other at the proper place. Then the yellow plate is prepared in the same manner, and then the red. Proofs of each plate are taken separately and together, to see if the right color scale has been worked out. If the final proof is correct, all the register marks on the several plates should print exactly one over the other and not blur, forming a single mark. When this is done, we have as a result a perfect colortype or picture resembling a photographic half-tone, only in natural colors. The greatest difficulty in this kind of engraving is that the operator must thoroughly understand the effects of one color upon the other, and be able to know what degrees of intensity of the primary colors must be used to combine at last into the perfect and natural shade.

The Meat Market of the World.

The Union Stock Yards, of Chicago, Where Millions of Dollars, Worth of Cattle, Hogs, and Sheep are Slaughtered Daily and Shipped To Every Quarter of the Globe.

CHICAGO supplies the world with meat. Daily there passes through the great Stock Yards on the southwest side of the city millions of dollars, worth of cattle, hogs, and sheep, beside vast numbers of horses, to be shipped to all parts of the globe. These yards gain their name by reason of the numerous railway lines that surround them in a square, and which bring here from all parts of the stock-raising country vast herds to be slaughtered and packed.

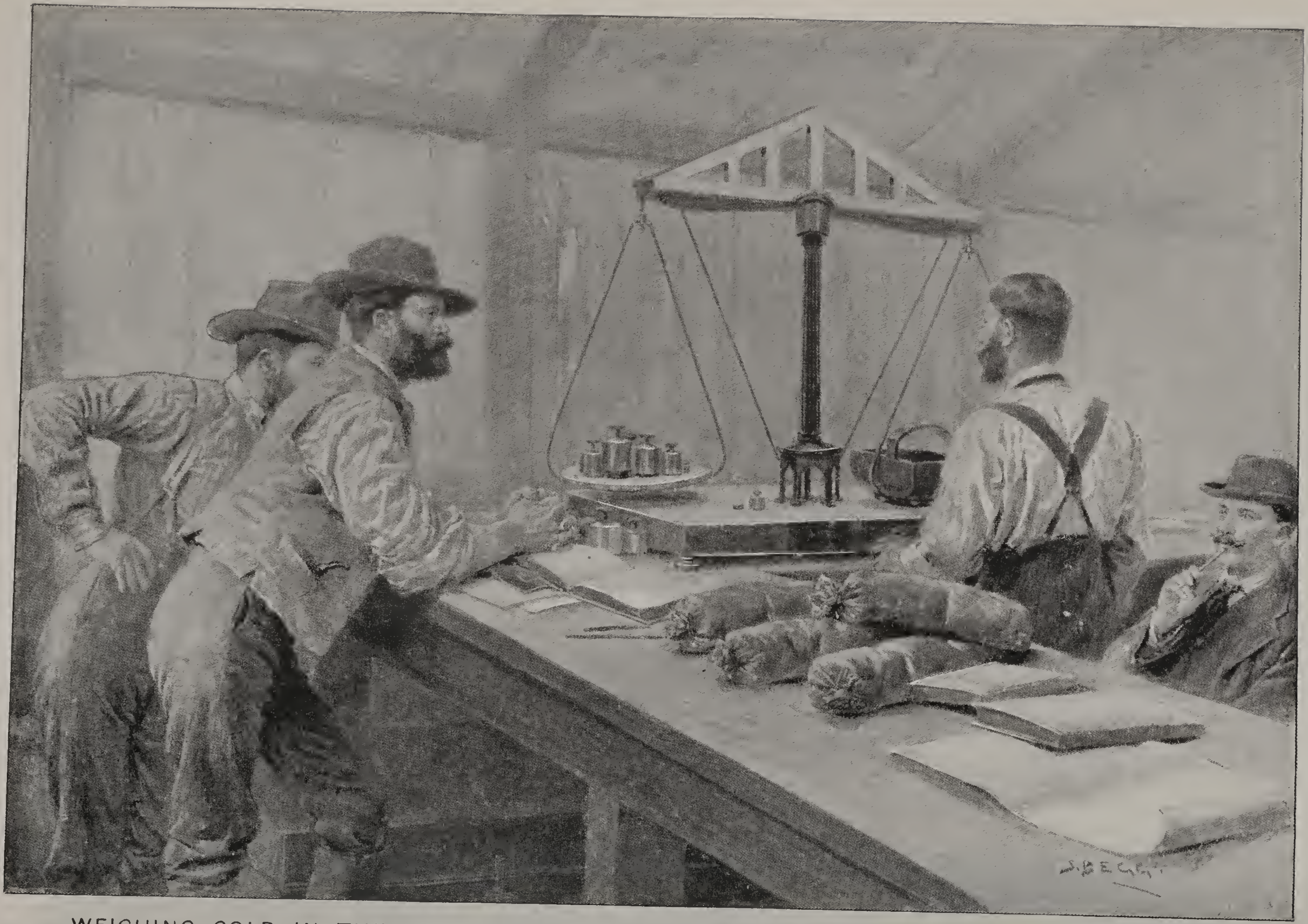
"KNOCKING" CATTLE IN THE KILLING PEN.

The Union Stock Yards is a corporation, virtually a monopoly, and has many of the powers of a municipality. Within its gates enter every morning, betwe 4:30 a. m. and 9 a. m., some 28,000 p sons, while there are employed in bo the yards proper and "Packington which is always considered a part of t yards, about 35,000 people. In 1899 t total receipts of animals were about 2,50 000 cattle, 140,0 calves, 9,200,000 hog 3,700,000 sheep, a 120,000 horses (for th yard is also the greate horse market in t world). To bring th stock to market r quired nearly 300,0 cars, or a train over 3 miles long. The Sto Yards Company co trols all manner of i dustries within it grounds, from wate plants and fire depar ments to restaurants and boot-blackin stands.

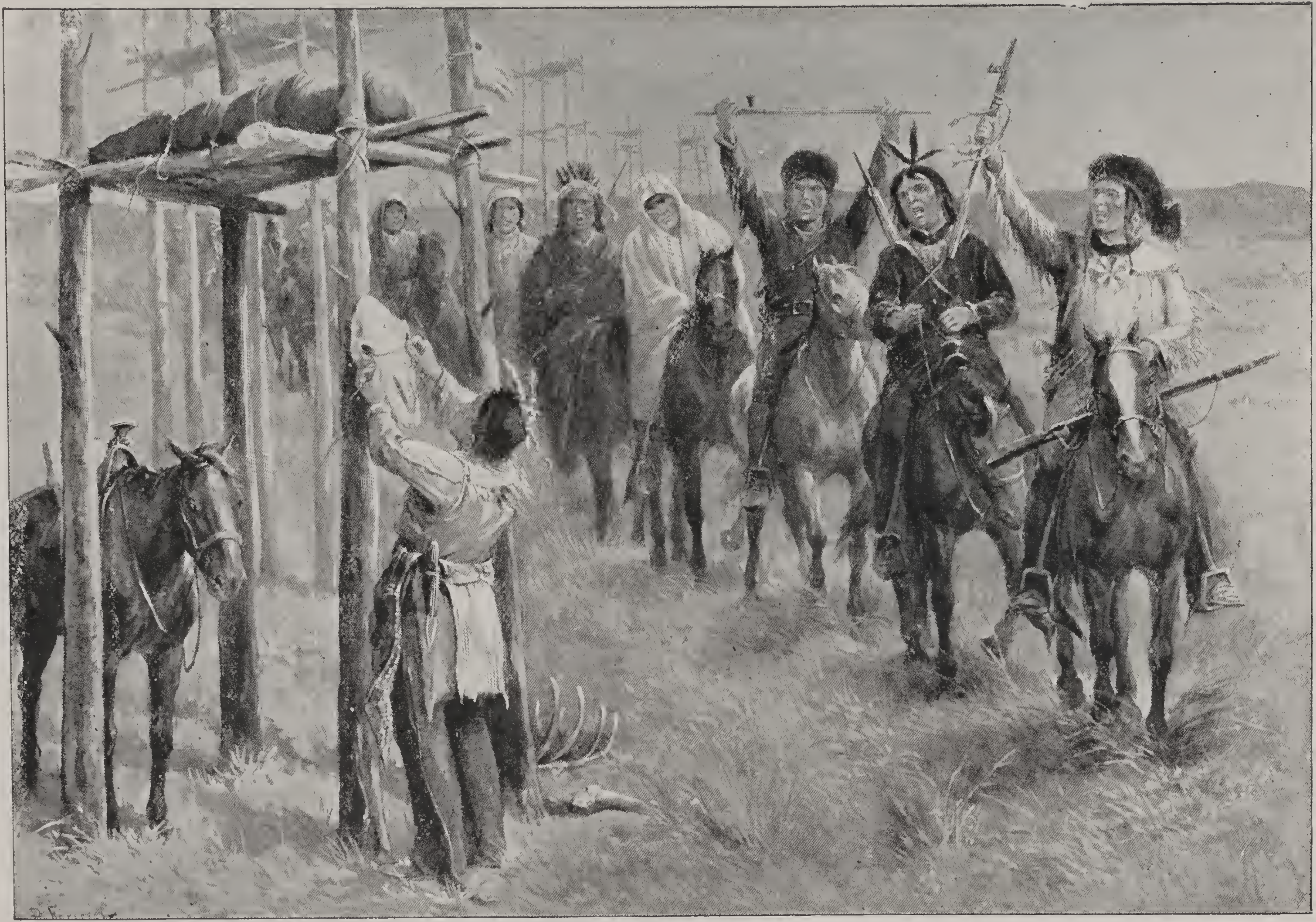
When a load of stock is run in on th side track, the cattle or hogs are run int chutes by the company and locked u until the man to whom they are consigne sends for them. Then a "key-man" open the chute and gives the animals into th care of the consignee. This man may b

TALKING WITH A MEGAPHONE

THE MEGAPHONE IS USED ON THE OCEAN, ON BATTLE-FIELDS AND IN VARIOUS SITUATIONS WHERE THE HUMAN VOICE WITHOUT THE AID OF THIS INSTRUMENT WOULD NOT BE HEARD

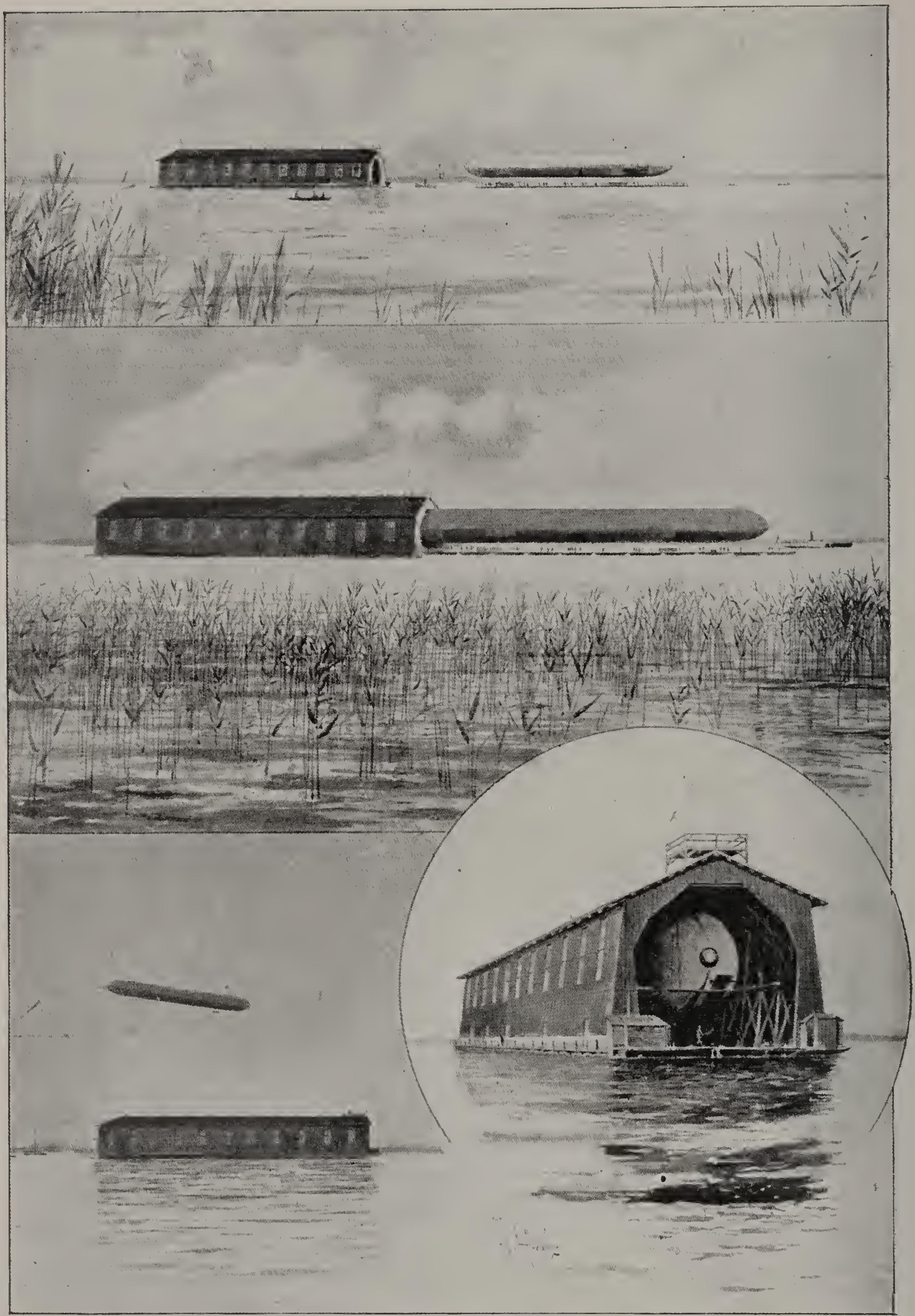


WEIGHING GOLD IN THE KLONDIKE—SCENE IN THE BANK OF BRITISH NORTH AMERICA



SALUTE BY INDIANS TO A DEAD CHIEF

IT IS CUSTOMARY FOR INDIANS TO PAY RESPECT TO THE MEMORY OF A CHIEF WHO HAS GONE TO THE HAPPY HUNTING-GROUNDS BY A FEW WORDS OF A WAR-SONG, A WARWHOOP OR HOLDING UP THEIR PIPES TO THE DEAD BODY



AERIAL NAVIGATION—ZEPPELIN'S AIR-SHIP

1. AIRSHIP CONVEYED TO THE SHED BY A TUG. 2. THE AIRSHIP BEING TAKEN FROM THE SHED. 3. THE AIR-SHIP STARTING. 4. THE AIR-SHIP IN ITS SHED.

a packer or a commission man. From the chutes the animals are driven to pens that custom has given to each particular firm. Here they are inspected and sold. As they go to the scales and are weighed government inspectors throw out poor stock, while a public shrinker docks some animals that are not in the best condition from forty to eighty pounds. Condemned animals have a tag fastened in their ears. Three main sections in the yards are laid off for cattle, sheep, and hogs. The cattle pens are large, roomy places which will hold several car-loads, and are brick paved. The pens for hogs are double-decked, that is, like a two-story house, one pen over the other. The sheep are all taken to a roofed place called the "sheep-house."

The Pens

are divided into blocks and divisions just like a township, to facilitate in locating stock. The yards cover no less than 475 acres, 320 of which are covered with plank flooring. There are 13,000 pens, 8,500 of which are covered for housing hogs and sheep. The divisions and blocks lay out the place with twenty-five miles of streets, while there are thirty-eight miles of water troughs for watering stock, ninety miles of water pipe and fifteen miles of sewers Six artesian wells furnish the water supply, and in summer time the tanks and reservoirs hold water for emergency to the amount of 8,000,000 gallons. Owners are put to no trouble in the handling of stock, for all kinds of feed are delivered to the pens by the company, and the watering, feeding and yarding is all conducted under its care at reasonable cost. Two hundred commission firms located at this market make competition acute. A thorough system of inspection for disease by government officials makes it almost impossible for unhealthy stock to be sold. And when one considers that in one year $230,000,000 worth of stock is yarded by the company and it seldom occurs that a single head is lost, one can possibly understand the magnitude of this great buying and selling center.

KILLING "KOSHER" CATTLE.
For Jewish customers meat must be dressed with especial religious rites.

But aside from the simple handling of

stock by commission men and speculators, the Stock Yards are noted for the latest and fastest methods for killing, packing and shipping to all points of the globe the meat supply of all humanity. The largest packers at Chicago include Armour & Co., Swift & Co., Nelson Morris & Co., Libby, McNeil & Libby, and the Cudahys. All these firms are capitalized in the millions, and nearly all have branch yards and packing houses at Kansas City, Omaha, St. Louis, and several other points, while they are represented by salesmen and markets all over the world. To give an idea of the immensity of one of these concerns the following figures are given: One company in 1898 purchased live stock to the aggregate of 1,437,844 cattle, 2,658,951 sheep, and 3,928,659 hogs. Sales the same year amounted to $150,000,000, and the total number of cars needed to carry the meats was 107,684. From this number of live stock there were made 196,244,585 pounds of lard, 6,472,857 pounds of wool, 3,88 983 pounds of neatsfoot oil, 5,487,5 pounds of glue, 8,116,338 pounds butterine, 26,009,453 pounds of tall and grease, 61,635,047 pounds of 90,079,748 pounds of hides, and 86,22 586 pounds of fertilizer. This sa company's plant at Chicago extends o forty acres of land, of which thir eight acres are covered by buildings, latter having floor space to the area sixty-seven acr Twenty-five engi with eighty-one boil and 12 dynamos sup the plant with pow and light, while sev refrigerating machi with 125 miles of pi have a capacity of co ing 1,400 tons of me daily. The storage a cooling rooms have capacity of 5,000 catt 7,500 sheep, and 12,0 hogs. Six thousand a eighty-five employ that carry on this gantic enterprise nece sitate a weekly pay r of $70,000.

IN THE HOG "STICKING-PEN."
Showing a sticker in the act of killing.

Numerous metho are used for

Killing

and preparing the stock for consumptio The cattle are driven from the buyi pens over long runways to pens near t slaughter houses. From these they a run one by one into pens within the hous each just large enough for one anima Platforms run along the side of the pens and level with the top. Along the platforms walk men with small sledg hammers, and when just above a stee one of them will suddenly swing the han mer with stunning force upon the head of the animal just between the horns. The animal drops to the floor, and then a gate is swung up, the floor turns upward on one side upon a pivot, and the animal rolls out, only to be quickly jerked to the ceiling by a chain fastened about one hoof. At once the throat is cut, and the head removed; the animal is drained of blood, and then in quick stages the hide, hoofs, shanks and inwards are removed, and sorted to their various departments. The "splitter" comes along and splits the animal down the backbone. All this time the carcass has been traveling upon an endless trolley; and now, after it has been washed and cooled, it is ready to be stored in the great refrigerating rooms, whence it comes later wrapped in cloth and is shipped away in specially prepared refrigerator cars all over the world. For Jewish customers a special killing is necessary because of the tenets of their religion that will not allow them to eat meat other than that killed by an ordained rabbi, or which has ever had a broken limb. Instead of using the hammer for stunning, the animal is first tied by the feet, then raised in the air by the one hind foot. A killer appointed by a rabbi comes along murmuring a prayer, and with a quick slash cuts the animal's throat. This process is called

Killing "Kosher,"

and is very rapid, in one plant 250 being killed and dressed an hour.

UNITED STATES INSPECTORS MARKING HOGS TO BE SHIPPED.

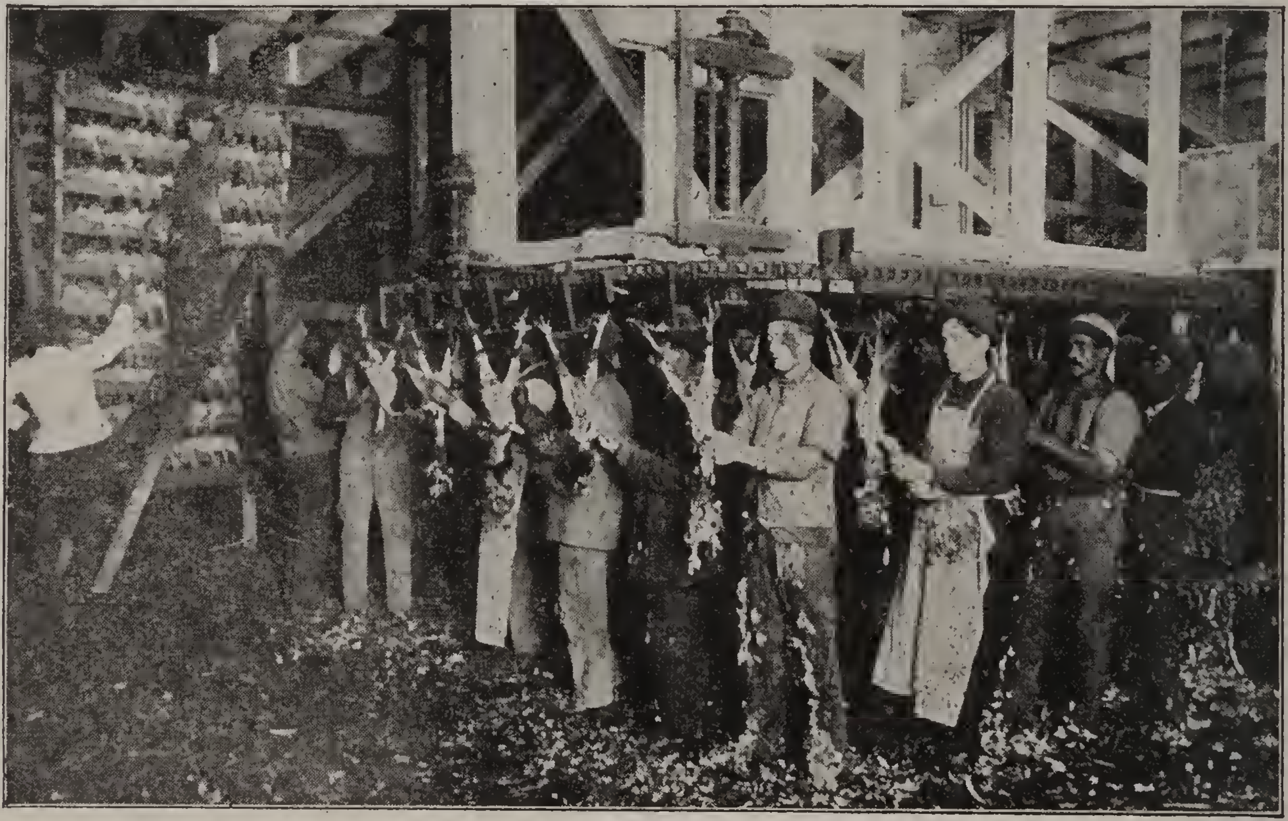
With sheep the process is similar to other killings, only the sheep are suspended two by two on hooks that run along a continuous trolley line. As each set passes a certain station a certain part of the process is completed. The killer sticks the knife in their throats at the rate of twenty a minute; then the animal moves along to each specialist until the carcass appears at the end of the trolley held apart with wooden sticks, ready for the chilling room. With this branch of slaughtering as with others, the Jewish method necessitates a special slayer, who places the edge of the knife between his lips and mutters a prayer before every death stroke.

With

Hogs

an odd device like a great drum, with six hooks at intervals on each side, revolves by machinery. Each hook is so arranged with a little wheel that, when a hog is fastened to one as the drum revolves, the hog is jerked with it till it reaches its highest point, when the little wheel slips on to the rail of a trolley and the hog is quickly run down to the killer. This man makes the quickest killing of any, numbering about twenty-five strokes per minute, while 550 wholly dressed hogs are turned out from one plant each hour. From the killer the hogs go to the "gutter," and then to the scalding trough, where in boiling hot water and with the aid of a scraping machine most of their hair is removed. Next in a cooler bath the last vestige of hair is scraped away by hand. From here the carcass goes through the general process of cutting up, only with hogs the cutting is in smaller pieces. The leaf lard is sent to markets or to the refinery; the sides are pressed into shape for bacons by hydraulic presses, while odd bits and cuttings are sliced off here and there and shot through tin chutes hundreds of fe long to other parts of the buildin where they are packed in boxes ready f shipment.

The process of killing must for facili be divided so that each man does but o part of the work; thus, one man kills, o man "guts," another removes the hid another chops off the hocks, while st others split and divide the carcass in marketable shape. The animal is alwa yet warm ere the process is complete, ar in from three to five minutes after t live animal is driven into the pen, t meat is ready for cooling. It is remar able that not an ounce of a slaughtere animal goes to waste. Every part th cannot be used directly for food, woo leather or oil goes to the "tank" and refined into glue.



CHICKEN KILLING.

With a corps of eighty men, 10,000 chickens, 8,000 ducks or 6,000 turkeys are killed and dressed by th above illustrated process every day. Each operator has his certain work to do; one man fastens the fowl legs to the hooks on the endless chain, and also hangs a little can to its neck just below the bill. Th chain moves on, a man sticks an awl through the neck of the fowl, and the blood drips out into the ca whence it is sent to the "tank" for fertilizer. Then as the chain goes on each man plucks his part of th feathers till all is done.

Great Governments of the World.

HOW THE NATIONS OF TO-DAY GOVERN THEIR PEOPLE.

GOVERNMENT has existed since the birth of man. Opinions differ with people and nations as to the goal to be reached by this or that nethod, but the intelligent person watches vith interest the growth in any form of he great science of politics and governnent. The entire human family has unlergone, or is still undergoing, vital hanges of government and mutual relaionship. A glance at the various govrnments in operation throughout the vorld at the present time will reveal he important fact that few, if any, of he methods familiar in the pages of istory are absent from the list. We still ave the savage communities, which inolve almost an obliteration of the family elation rather than the existence of one arge family; there are the nomadic ordes and camp-followers, grazing their erds on the edges of the desert at one ime, and threatening to overthrow the vorld at another. Some countries still hink the individual exists for the benefit f the government rather than the govrnment for the governed. Let us glance t some of the larger nations with their nost improved and enlightened methods f government, as well as their errors.

FRANCE.

In France, as much possibly as in any other great government, we have the extremes democracy and monarchy combined. When the old monarchy went to pieces under Louis XVI., the masses were afraid to trust any of the aristocracy with the reins of government, and, accordingly, boards were appointed to manage the different departments. When Napoleon assumed control, however, it was an easy matter to place trusty tools or single officers in charge. After him came changes of republics and empires until to-day, under the third republic, we have a system of government combining the features gained from the advanced republican thinkers of France (the country most advanced in theoretical republicanism) with those of a strongly centralized military rule. One cannot study the government of this powerful republic without taking into consideration the enormous power wielded by the army, and the almost implicit confidence placed by the common people in that body.

A national assembly, elected to treat with Germany after the Franco-Prussian War in 1871, found itself in control of the government, and while the members were largely monarchists, the general tendency of France as a whole was toward the republican form of government, therefore the assembly dared do nothing but draw up a republican constitution. To be sure, the constitution was rather meager, and tended strongly towards the monarchical, and it was not submitted to the people for approval, nor is such now necessary. We have, therefore, these two tendencies of monarchy and republicanism struggling for supremacy.

The divisions of France for electoral and administrative purposes are eighty-six departments, which are divided into smaller districts,—362 in all,—which are in turn divided into still smaller cantons, 2,899 in number, while the smallest subdivision is the commune, of which France has 36,170. Three sides of government exist, the legislative, executive and judicial, though all are so centralized that a comparison to the government of the United States would be entirely out of place.

The Legislative Department

is divided into a chamber of deputies and a senate, members of the first to the number of 584 being elected for four years, while those of the senate are elected for nine years, one-third retiring every three years. Each male citizen of twenty-one years who has resided six months in a commune, and who is not disqualified, may vote. Deputies must be citizens twenty-five years old, and receive $1,800 a year and free transportation on all railways. As a rule they are men of ordinary caliber, being retired business men, doctors and farmers. Senators are forty years old or more, and average sixty-three years, with salary the same as the deputies. The deputies are elected directly from the districts, though some of these are so large that two or more constituencies are made from them. Election day is set by government and not by law, and always comes on Sunday. If no candidate receives an absolute major of all the votes cast, and at least o fourth of the registered voters in his c stituency, another election is held in t weeks, in which a simple plurality elec and if a tie occurs, the oldest man chosen. Senators are chosen from d partments by electoral colleges (bodi of men elected for the purpose) compos of three classes: first, of delegates chos from the municipal councils of the diffe ent Communes in the Department; se ond, of senators and Deputies of the D partment; third, of members of the cou cil general of the Department, and of tl members of the different councils in tl Districts of the Department. The se ators are not often men of nation reputation, but retired professional me from the country towns. The work the senate is not much beyond that deciding with the president when tl chamber of deputies shall be dissolve and that of sitting as high court for im peachments and trials of persons wh threaten the existence of the state. In ge eral it is a body inferior to the chambe

The President of France

is elected by a majority of the chambe and senate sitting in joint session, an no member of the royal family may ho the office. The president's salary is $125 000 yearly, with a great retinue of serv ants and the free use of the palace (Palai d'Elysees) in Paris. He has no veto o legislation, though he may return a bil for a second vote. He may adjourn th houses, though only for a month; ma close a session over five months old and with the consent of the senate ma dissolve the chamber of deputies. The president has for his advisers a cabinet o eleven ministers of the different portfolio of finance, war, marine and the colonies foreign affairs, etc., whose salaries are each $12,000 a year. These ministers are chosen by the president with a view to their influence in the respective house of which they may be members, and generally with the advice of the presidents of the two houses. They really frame the legislation of the administration, and must sanction the acts of the president ere they are effective. They speak in both houses, whether they are members or not, but when they cannot control the bodies in legislation they are forced to resign, and a new cabinet is chosen. The smallest factional fight will defeat a cabinet, the average life of the cabinet being about eight or ten months. And yet the government is largely that of the cabinet rather than of the president, for the latter really has no very great powers, and is more a luxurious figurehead than anything else.

Legislative Methods

begin with a choice of eleven bureaus in the chamber by lot at the start of each annual session, while nine are selected in the same manner by the senate. These bureaus choose from their numbers a monthly committee on parliamentary initiative, to which all bills are first referred, when presented, to decide if they are worthy of consideration. This committee practically passes all serious bills, and after printing them refers them to their respective bureaus. The bureau selects a sub-committee for study of the bill, though this is generally on party lines. After the bill has been amended to suit the committee, it is presented before the chamber by a commissioner, who does not speak from his seat, but from a "tribune" above and behind the chair of the president of the house. The speaker (president of the chamber) has nothing of the great power wielded by the same officer of the United States, though he is elected by party rule. French parliamentary practice differs greatly from that of almost any other country, it being nothing uncommon for members to shout out their opinions of disapproval of the person speaking, and even the speaker will stoop to trivial criticisms of members and speeches.

Another body, the "council of state," a relic of the days of Napoleon, performs the function of advising the president and ministers on matters of public importance. The members are, in many cases, men of learning, and do considerable good in preparing rules for administration, though, as far as legislation is concerned, they are of little avail, for they are not generally consulted.

Since the cabinet is dependent upon the chamber for support, it must naturally deal out favors to the deputies. These are largely in the shape of offices for friends and political aids. Public opinion is largely felt in France, and to avoid censure of the press, it is a well-known fact that the great sums of money at the hands of the cabinet for secret service are largely spent in subsidizing the newspapers.

The System of Courts

starts with the usual local justices of the peace, ascending through courts of appeal to a final supreme court. The president of the republic appoints the judges, with the aid of the minister of justice, and with the exception of the justices of the peace the tenure of office is permanent. A special court also exists, composed of judicial officers and men of administrative training, whose duty it is to decide disputes arising over administrative questions or between officers of the administration and citizens. The methods of procedure in French courts are entirely different from those in America or England, and while there is not so much chance for a guilty criminal to avoid sentence, at the same time, the system lacks the security of personal liberty. One judge in secret does the work of examining cases instead of a grand jury, and he may dismiss the case or commit it to trial at his own discretion. Many courts which sentence but for three or four years consist of three judges who act without a jury. A prisoner may be kept for days without communication with his friends, and if the judge so wills it, all the evil effects of the old "lettres de cachet" of the days of the Bastile can be reproduced. In the higher courts twelve jurors generally assist the judges and decide by a simple majority. In commercial cases there are special courts and councils made up of experts.

In Local Government

each district has a prefect, or sort of governor, appointed by the president for an indefinite term and responsible to the cabinet. A general council of the department, elected by general vote for six years, one from each canton, assists him. These carry on the general work of the department, such as management of schools, local courts, railroads, asylums and the poor. Likewise the district (arrondissement), the next smaller division, has a sub-prefect appointed by the prefect, responsible to him and really acting as his agent. A council, one member elected from each canton, has the work of dividing the taxes among the communes. The canton is simply a small election district and judicial district for justices of the peace, muster district for the army, etc. The commune (still smaller) is self-governing, and is the unit of all government. Each elects a municipal council according to its population, and this council elects its mayor. The mayor, however, when once elected, becomes the agent of the central government at Paris, and may be suspended or removed if so desired. By the system of appointments and removals from office the government can for a time be absolutely despotic in its decrees, though when this happens new elections shortly remove the real offenders. Thus we have really two extremes of government, yet the great centralized power is plainly shown for the good in the great roads, bridges, expositions, public improvements and educational institutions of France.

GERMANY.

After the ravages of Napoleon upon the German states, their rulers naturally sought a defensive alliance. Till after the war of 1866 Austria was the natural leader of the union, but at that time Prussia came forward and Austria was thrust out. Three forces set to work to bring about what is now the German Empire, namely: first, the necessity of union of the several states; second, the great Bismarck of victorious Prussia, wishing order more than freedom; and, third, the princes of the different states, desiring to perpetuate their thrones, and wishing a degree of states' rights.

History.

After the victories of the Prussian army against the French, the king of Prussia was elected the president of the union with the title of "emperor," and the first coronation—that of Emperor William—took place in the palace of Louis XVI. at Versailles, near Paris, which was still besieged, January 18, 1871.

Shortly afterward a diet was called and the new constitution was drawn up. This has not distinctly marked in it the three-sided form of government so familiar to Americans.

The Imperial Government

consists of the emperor and his administration, a federal council (or bundesrath)

BRIDGE ACROSS THE RIVER ARNO AT FLORENCE, ITALY

ARCH OF TRIUMPH, PARIS

COLOSSEUM, ROME.

similar to our senate, and a diet (or reichstag) similar to our house of representatives. The latter is composed of 397 members elected by popular vote for five years. Any German twenty-five years old can vote or be a candidate. The members are not paid, but receive free transportation. Bills cannot be introduced in the diet without support of at least fifteen members, and when a bill concerns only a certain state, either in the federal council or in the diet, the whole house does not vote, but rather only that portion affected by the bill. The diet must be consulted on war, the senate on treaties, and neither house can adjourn for more than from day to day, the emperor having the right to fix the dates of adjournment. He is also empowered to dissolve the diet and order a new election within sixty days. The federal council is almost a counterpart of our senate, being composed of ambassadors from the different states of the union, selected by the head of the state, aided in a measure by the legislature. They vote according to the number from their respective states, and votes are cast in a lump by one spokesman for each state. The council is a perpetual body, and the emperor must convoke it upon the request of one-third of the members. The imperial chancellor presides over the council, and in case of a tie, his vote produces the necessary majority for legislation. The council must concur in the legislation of the diet before it becomes a law, and accepts or rejects treaties. In case a state of the union shall not obey commands, the council may enforce its edicts with arms. The council is also empowered by the constitution to execute laws whenever no other provision has been made by law, thus giving, it is said, the actual sovereignty of the empire to this body.

The Emperor

at first glance would be thought to have no more power than that of our president, but it must be remembered that the constitution makes the ruler of Prussia its emperor. The Prussian crown descends to the oldest male, hence a man is always in power. This allows customs to grow up, and privileges are granted the ruler that would never be the case if a president governed, or if the emperor came from a different state each time. Also the German people have a great respect for the glory and grandeur of the imperial throne; the emperor represents the empire in all its foreign affairs, appoints ambassadors without confirmation, and receives those of other courts. Besides this, he is almost absolute lord over an army of 500,000 thoroughly trained soldiers, always ready for the field. As king of the Prussians, he controls their seventeen delegates in the federal council, and it would mean almost revolution if he could not secure the other fourteen votes necessary for a majority. And then Prussia has absolute veto power on questions relating to the army, the navy, and the imperial taxes. This gives the emperor power enough to whip any faction into line.

Bills

are generally prepared by experts and submitted first to the council, and if passed here sent through the chancellor to the diet. Amendments of the constitution are not referred to the people, but are enacted by the council. If fourteen votes are cast against such a measure it cannot pass; hence, it can be seen that no group of smaller states can force on Prussia, with her seventeen votes, a distasteful amendment, and yet neither can Prussia so work against the smaller states that they cannot secure fourteen votes to quash measures harmful to them.

The Chancellor

is the emperor's right-hand man, appointed by him and removed at pleasure. He generally controls politics, is head of the Prussian delegation in the council, and presides over that body. All acts must be signed by him before they become law. Bismarck was the greatest of the chancellors.

Local laws of the different kingdoms of the empire govern mostly in the courts. There is the usual system of local, district and superior courts in the various kingdoms, the judges being appointed instead of elected. From the superior courts appeal is had to the imperial supreme court, which consists of eighteen judges who sit for life and are appointed by the emperor. The empire has a code of criminal law, another for commercial, and recently a civil code that governs the judiciary of all the kingdoms. The powers of the supreme court do not reach to declaring acts unconstitutional, for there is no distinction between constitution and statute. In fact, the judiciary of Germany is only a branch of her political administration.

The nature of the empire, while

Not Strictly Democratic,

is yet as much as can be expected of monarchical states, and very well fits the people it governs. It is no loose confederation, but a firm pact,—an "indissoluble union of indestructible states." Its laws take precedence over those of its states, and a revolting state would be brought to terms by arms. The taxing power is limited to customs and excises on salt, tobacco, beer, brandy, beet sugar and sirup. Pro rata contributions can be called for from the kingdoms to meet emergencies. The empire controls the coinage, railways and telegraph, though the states are allowed to operate mints, and to some extent own railways.

The main defect of this government is that it has no bill of rights in its constitution that guarantees to the individual certain rights against the encroachments of the government when in the hands of unscrupulous agents.

GREAT BRITAIN.

The government of Great Britain is that of a limited monarchy in name only, for, though the oldest member of the reigning family holds the crown and title, as well as the honors of a monarch, yet the power is so limited that were the ruler to attempt to coerce the representative branches of the government, revolution would result in dethronement. The government is that of a cabinet under constitutional control as worked out by a house of commons and house of lords, influenced to some extent by the King and to a great extent by public opinion. Unlike the constitution of the United States, that of England is unwritten, being a mass of customs of gradual growth which it has taken years to be brought out from public acts of the parliament against the reigning sovereign.

In Early Times

in England the power of the monarch was nearly absolute, but gradually, by hard fights, the people gained rights in representation in parliament, some monarchs were deposed, others executed, and still others judged insane or incompetent and regents were appointed. The house of commons deposed Charles I., appointed Cromwell president of the Commonwealth, and later called a monarch back to the throne. James II. attempted later to enforce edicts distasteful to parliament and was deposed, to be succeeded by William and Anne. Since these rulers a cabinet has always played an important part in English government. When eorge I. came to the crown he did not ıderstand English, and necessarily aned a great deal upon his cabinet. ater, George III. tried to do away with is institution, but he eventually had to me around to its use again. Since that ne

The Cabinet

s grown into a permanent branch of the vernment, though not mentioned legally such, it being simply a growth by cus- n for convenience' sake.

This cabinet is of from fifteen to twenty the chief ministers of the various de- rtments or portfolios of the government. state of affairs that brings about two litical parties is necessary for such a m of government, for each party ıst strive for supremacy, and criticise acts of the other. The ministers urally have control of the parliament as to influence the passage of impor- t measures, or they are of no power l have to resign. When a great issue t stake, the party that is defeated must necessity resign the ministry and with he cabinet positions, for without sup- t of parliament a dead-lock would ult. The alternative is had of dissolv- the house of commons and appealing elections to the spirit of the public. nembers in sympathy with the measure stake are returned to the house, the ninistration is vindicated and the bill assed, for if the house of lords refuses agree in the legislation, which by law ıecessary, the house, with the queen, create more new peers to take seats in house of lords, and thus effect a pas- . It is to be seen, therefore, that

The House of Commons

e direct representative and servant of public, that it is superior in power to lords when really supported by the ple at large, and that the reigning sovereign must to a great measure coincide with the wishes of the government of the house of commons in order to avoid a revolution. If, then, the commons is so powerful and the direct agent of the people, what is the office of the cabinet, and why is the government at all a monarchy? First, the cabinet is not recognized as such by law. As said before, it was of gradual growth, a secret body of advisers to the sovereign. The party having control of the parliament, and hence most directly representing the people, is the one that the sovereign must consult in order to have any legislation passed. Therefore, when one ministry and cabinet has resigned through lack of support in parliament, the queen calls to her aid the leaders of the victorious party in both houses, appoints them to the offices in the ministry (the privy council), and from the officers of the ministry selects the cabinet that is to originate and influence legislation and administrative acts. Having no standing according to law, the cabinet may act not as the cabinet but as the privy council. The head of the cabinet is the premier, but neither is he recognized by law; he is generally the minister of foreign affairs.

As to the second point,

The Government is Monarchical

because the queen, though not having veto power, yet exerts a powerful check on the cabinet, lords and commons, and though the people are largely democratic, yet they have a great respect for their sovereign, and would not return to parliament members that would willfully set at naught her rule.

The method of administration and legislation, then, is that the cabinet of leaders of a certain party, backed by an influential force in the commons and lords, in secret session discusses and frames plans of action. The advice and consent of the sovereign is gained, and the measure sent through both houses of parliament. If the houses concur, it is legal; if they disagree, the cabinet (as privy council) and queen may dissolve the commons and trust to an election to vindicate their ideas; or the cabinet may resign their positions in the ministry, whereupon a new ministry and cabinet is formed from leaders of the victorious party. Altogether, the system of checks and balances is admirable, the main feature being that though the queen can do no wrong, her ministers, as guided by her, can, and they are directly responsible for bad management, being forced to resign at the lack of public approval.

Since the

Constitution is Not Written

the courts do not sit upon the constitutionality of an act; the parliament is all powerful, and any legislation passed by it is presumably constitutional. Thus, if the judiciary, which is entirely separate from the legislative and executive branches, though appointive in some degree, should judge laws contrary to the opinions and wishes of parliament, acts would be passed that would nullify the old laws. The judiciary holds office for life, and cannot be removed except for cause. This gives a great degree of liberty to their acts, and tends toward justice in the main. The

House of Lords

has power almost collateral with that of the house in making legislation, except that it cannot introduce or amend money bills. The privy council, which is the legal body of the ministers in session, does the official negotiating with the queen and signs acts. Altogether, there are five sources of influence that bring about English government: First, the queen legally and formally appoin
second, the cabinet cannot continue
exist unless it has the support of a m
jority of parliament—thus the commons
said to choose the cabinet; third, whe
new house is elected, the voters determ
who shall be next prime minister, for t
leader of each particular party is in mi
when the ballot for members is ca
fourth, parties must exist to keep t
system of cabinet up—that is, one pa
must always be ready to take the place
the one in power, thus making all a
open in the light of publicity; and, last
the man himself must develop into
leader in order to give a possibility
cabinet rule over the sovereign and lor

RUSSIA.

Autocracy, or government imposed up
a people rather than created by them
the principle upon which Russia is rul
And yet in the home life of the Russ
villagers democracy is pre-eminent. Th
the worst and the best form of gove
ments occur in the same land, at oppos
ends. The land of Russia is one-seven
of that of the whole globe, covers the c
sides of both Europe and Asia, and
inhabited by about 130,000,000 peop
Three-fourths of this nation are people
the Slavic race,—people who for centur
have threatened the southern countries
Europe, and who, it is feared, will
day dominate the earth. They
admirably adapted to colonizing, a
when in their early history robber chi
arose who oppressed them, they simp
moved to another quarter of their coun
where, in their "mir" or village, th
could have some degree of freedom in t
ownership of land. They did not dre
slavery, but while being owned bodi
they still persevered in the customs of t
"mir."

History.

When all the rest of Europe was being eed from the feudal system by the upris- ng of commoners, Russian nobles were ust beginning to see the richness of the rize that lay before them in the shape of nocent villagers who knew not the terrors robbery or slavery. At once the poorer asses were forced to carry out the will the noble; law was unknown as the fspring of the people, and commands nd edicts took its place.

Peter the Great,

ho died in 1725, was the power that first egan to bring order out of chaos, and e autocracy that he organized has re- ained for almost two hundred years to e present time. A great part of his ork lay through the church. Russians ad long been of the Greek orthodox urch. A patriarch existed and the urch owned its lands. Peter at once spensed with the patriarch, confiscated e lands, and appointed a

Holy Synod.

do the bidding of the czar in matters clesiastical. Since the church is thus der the direct will of the czar, it must llow that any belief not to his way of inking must be persecuted and perish. gh-mindedness must needs soon dwin- e, and instead of exposition of religion d teachings for the goodness of the lief, there is in reality nothing but vast remonials and endless doings. Thus, rough the church, the czar wields an ormous influence over the minds and uls of the common people.

Three Agents.

Besides the holy synod, the czar has ee other methods of executing his will: committee of ministers, a council of te, and a senate. With these divisions e would suppose some division would be made of legislative, executive, and judicial duties, but such is not the case. That would be an approach to democracy, and we are here dealing with autocracy. All these bodies exert the functions of all branches of government, though each has its particular duties. However, the executive, instead of having a check put upon him by the people or any other branch of the government, is absolute; he issues orders instead of laws. Thus there is no legislative branch, the usual bodies simply aiding in suggestions for the executive and in seeing that they are properly issued. Neither is there such a thing as a branch of justice, for since there are no laws, there must needs be no interpretation of them; simply the enforcement of the commands of the executive. In short, the czar wills, the czar sees that his will is obeyed, and the czar punishes arbitrarily any disobedience.

For convenience' sake there are

Twelve Departments,

such as state, navy, justice, foreign affairs, and the like, and the heads of each, appointed by the czar, form the committee of ministers. Their duties are to aid in conducting the affairs of administration, and issuing explanations of the so-called laws. They may not resign without the consent of the czar, for then he would not be having implicit obedience. The council of state consists of some sixty members appointed by the czar, of which twelve are the ministers of the various bureaus. The duties of the council are principally those of consultation and information. Reports of the departments are read here and discussed, and special commissioners appointed by the czar look into the details of recommendations of the ministers. The council also considers the annual budget, or expense account.

The Senate

is the body through which the so-called laws are patched up in shape to dupe the people. It is composed of high dignitaries, also appointed by the czar, and these men have in charge the putting into effect of all commands. Ministers or governors of provinces are also here called to account for their conduct. The senate is regarded as the last court of resort in the feeble judicial system, though the council of state may review its acts.

Thus, there are four main agencies for the execution of the will of the imperious czar: the holy synod, for church matters; and for matters of state, through twelve departments or bureaus and the committee of ministers, the council of state, and the senate. All sorts of work are done in all bodies, and the sole object aimed at is the union of every phase of government into the single person of the czar.

Yet, while this autocratic method is pursued with cruelness over the great needs of the state, in the family life democracy is triumphant. Entire freedom of will is expressed in the

Government of the Town Meetings

by the heads of families, custom having gone so far that decisions must be unanimous to be effective. The "mir," or town, is all-powerful in all matters that pertain directly to its domestic life; its officers are responsible to the people at large, and it is no branch of the rule of the czar. All the czar wishes is obedience to laws, especially in the matters of taxation. Here the "mir" is willing to submit; the people are simply victims of the higher government, but complain little if let alone in their home life and ownership of land.

It is not to be wondered at that such a government by one powerful and possibly unscrupulous man should cause uprisings and plots. In fact, the government uses such methods, and the people copy af them. It is said that assassination is frequent method of meting out so-cal justice to the czar's subjects. After time such a rule must needs dwarf t sensibilities of the people, and then wo punishments must be prescribed to arou dread.

Flogging

and exile to the mines in Siberia are daily occurrence. Without warning, t government lays hold on those who ha broken no law, and subjects them to t severest penalties. What wonder, the if the government that uses the sword the place of law must in the law of natu sometime perish by the sword?

THE UNITED STATES OF AMERICA.

It is a common and erroneous sayi that the constitution of the United Stat is the most marvelous instrument ev struck off by the brain of man. Tl would lead people to think that our for fathers simply sat down to the task writing a constitution, and produced paper at first thought that has sin proved almost perfect. Such was not t case. For generations before, both t colonists in America and their Briti cousins across the water had been fighti the domineering power of the Engli crown, and as a result many concessio were made to the

Representatives of the People.

Though we were oppressed by governo not our own, and by foreign-made law yet we had in every colony some form democratic government as expressed the councils and assemblies. In mo cases there had been grants or charter given by the sovereign, enumerating ce tain privileges. These were in reali little constitutions. All the coloni were in the habit of sending complaints to England, sometimes even rebelling if the governors did not acknowledge the proper powers of the people. What wonder, then, that upon throwing off the English yoke the different colonies should at once frame constitutions democratic in nature, somewhat improving upon their old forms, and later that the colonies upon uniting into the common union should combine all their various forms into one instrument? Many clauses in

Our Present Constitution

were deemed decidedly undemocratic by some of the colonies, and vice versa. Thus the great central system of our government is built about an instrument that was in every sense the outcome of simple experience, and one of compromises and concessions.

In 1787 a body of men framed this constitution, and referred it to the various colonies for ratification. The instrument stipulated that upon the adoption by nine colonies it was to be effective, and was to be permanent. In 1788 nine colonies had igned, and in 1789 George Washington was installed as the first president, with he capital at New York. The government thus laid down in writing, and which by common consent is supreme, onsists of three main departments: legislative, executive, and judicial. The first omprises two representative bodies: the senate, or upper house, consisting of two members from each state elected for six ears each and so divided that one-third f the house is new every two years; and he house of representatives, consisting of members from each state in number ccording to the population, and each ected for two years. The senators are hosen generally by the legislatures of he states, and if a vacancy occurs during acation, the governor of the state temporarily fills the vacancy. The representatives are elected directly by the people of the congressional districts of each state. These two houses are almost co-ordinate in their powers, though only the representatives can introduce money bills, and only the senate can ratify treaties with the president, and agree to appointments made by him.

L. of C.

The President of the United States

is the main executive, elected by an electoral college, and serves for four years, with the privilege of re-election. The electoral college consists of members chosen from each state, equaling in number the representatives and senators of that state. These electors are chosen at large by the people of the state, and at the capital of their state on a day appointed by law they cast their votes for president and vice-president. The votes thus cast are forwarded to Washington, where they are all counted together and the decision made as to the man elected. All the electors of one party in any state may be elected by a bare majority, especially if election districts are so marked out as to favor that party. Thus, while the popular vote of the whole country might favor a president of one party, the system of electors may result in placing a man in the chair who has the less number of votes of the people behind him, as when Harrison was elected over Cleveland in 1889. As far as law is concerned, the elector is not bound to vote for any particular candidate, but custom has arisen by which they pledge their votes for the leader of their respective parties.

The Duties of the President

are to see that the laws of the land are duly carried out, to send a message to each congress suggesting needed legislation, and to sign or reject bills for legislation. He has the veto power, but the two houses of congress may pass a bill over his veto by a two-thirds vote. He is commander-in-chief of the land and naval forces of the United States, is the official representative of this country in dealings with foreign powers, and is the general adviser for the welfare of the government. Assisting, though not called for by the constitution, are a number of officers who head the different departments of state, navy, war, interior, treasury, etc., and who together form his cabinet. With these men, who, by the way, are selected by him with the consent of the senate from the greatest men in the country, he consults on matters of administration. They are directly responsible to him for their acts, and censure would lead to resignation, though not necessarily without the demand of the senate. Each of the department heads sees that the work in his particular province is carried on; for instance, the postmaster-general controls in a great measure the post-offices all over the country.

When

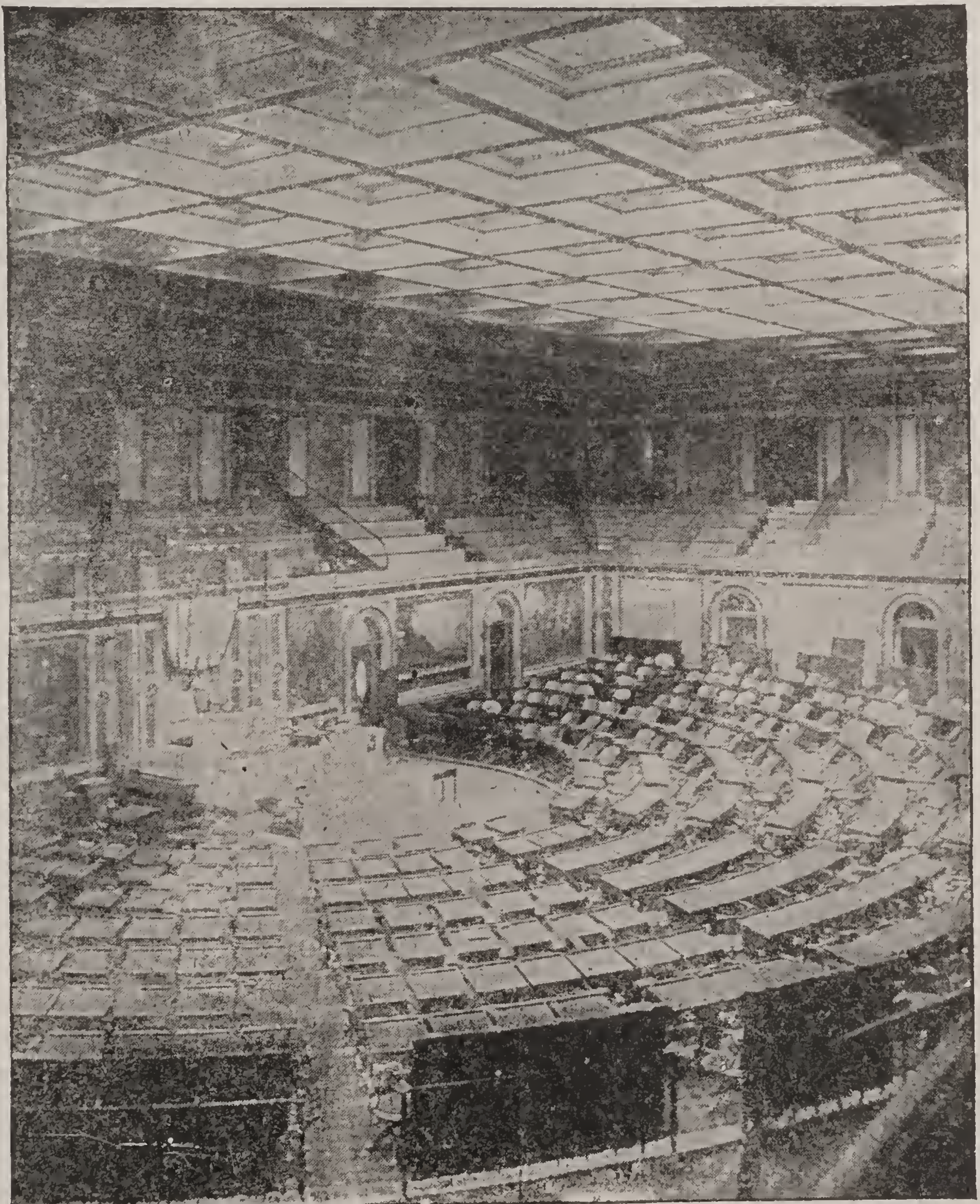
Legislation

is proposed in one of the houses it is sent over to the other for confirmation. Here it is either refused or passed. In the latter case it goes to the president for his approval. If he signs it, it is at once a law; or if he allows it to remain unsigned ten days there is the same effect. As before said, he has the veto power, but he cannot block legislation that has the support of two-thirds of congress. The senate is the more conservative of the two houses, for it represents not the people directly, but rather the individual states of the Union. Here are brought to naught many of the bills from the house of representatives that are considered too radical. The legislation in the house of representatives is carried on largely by committees. A speaker elected by the house appoints a number of standing committees for various subjects to be considered. When a bill is presented, it is at once referred to a committee, which refers it to a sub-committee. If the bill is in favor with the party in power the committee reports favorably, and a vote is cast. But if otherwise, the committee never lets it see the light of day again. Thus it may be seen what a power resides in the speaker.

The Judicial Department

consists of a supreme court and various lower courts, entirely independent of the other two departments, though generally somewhat in sympathy with them. The federal courts, which are courts of the United States as a whole, in distinction from those of state power, pertain only to the laws of congress and the constitution, with the exception of the supreme court, which is the court of last resort for any legal question, be it of state or federal law. To understand just the distinction between the federal and state powers one must know that in their local governments the states are absolutely supreme, that is, of course, where they do not come into contact or conflict with the powers given by the constitution to the federal government. The federal authorities govern only such questions as interest the whole union of states. The minor matters of the states, such as police, civil and criminal laws, schools, etc., are in the domain of the states alone. These have assemblies consisting of two houses elected by the people, and a governor, for the enactment of state laws and the execution thereof. Whenever the federal government attempts to encroach upon the rights of the states, they at once appeal to the constitution, which is the supreme law of the land. The judiciary decides what is the proper construction of the constitution, and declares the law valid or void as the case may be. Thus we have a system of checks and balances as good as almost any government. The president cannot act without the aid of the houses, the houses cannot enact legislation, unless by great majorities, without the consent of the president, and after the law is enacted, if it is questioned, the judiciary must also be in accord with the other branches of the government before the law is legal.

The tendency all the while is for the **Supreme Court** to uphold the acts of congress and the president, for it considers that the congressmen are serious in their intents, and not merely passing laws to hold their positions. This leads the federal government more and more to control the states, and tends toward a centralized government. But if the people do not like this method, they at once resort to the ballot, a new president soon takes the chair, and new senators and representatives govern more in accord with the sentiments of their constituents.



HOUSE OF REPRESENTATIVES, WASHINGTON, D. C.

Colonial Government of the United States.

THE president is giving careful attention to the selection of civil governors for Puerto Rico, Cuba and the Philippines. As commander-in-chief of the army it is within his authority to designate civil governors to act under the direction of the secretary of war.

In administration circles it is not expected that congress will take hasty action concerning Cuba, Puerto Rico or the Philippines. Until congress relieves him the president will remain in supreme control of affairs in the islands, and he is proceeding under the conviction that the welfare of the people will be in his charge at least during the remainder of his present term.

PUERTO RICO.

The problem of civil government in the islands yielded or ceded by Spain presents itself in the simplest form in the case of Puerto Rico. That island is fully and without question under the sovereignty of the United States. It came to us not only by legal right, but with the cheerful and unanimous desire of its people, who are peaceful and loyal, and eager for the benefits to be derived from the application of American ideas of government.

In determining the question as to the form of government and the participation of the people of the island therein, the most important fact to be considered is that the people have not yet been educated in the art of self-government or any really honest government. The difficulty does not consist merely of a lack of familiarity with the methods and processes of government; it lies deeper than that, in the fact that the Puerto Ricans, as a people, have never learned the fundamental and essential lesson of obedience to the decision of the majority. In the experiments which have already been tried in municipal elections and toward government by municipal boards, the minority which is voted down almost invariably refuses to participate further in the business of government.

The attitude of the defeated party is precisely that which causes the continual revolutions in the government of other West Indian islands and the Central American states in the same latitude. It would be of no use to present to the people of Puerto Rico now a written constitution or frame of laws, however perfect, and tell them to live under it. They would inevitably fall unless they had a course of tuition under a strong and guiding hand. With that tuition for a time their natural capacity will, it is hoped, make them a self-governing people.

Plan of Government.

Some such provision should be made for future government as the following:

That we should first declare definitely, by statute, what general laws of the United States are to be extended to the Puerto Ricans, such as, for instance, the postal laws, the banking laws, the customs, navigation and internal-revenue laws with such modifications as may be deemed advisable, the laws against counterfeiting, the anti-trust laws, etc., and provide for federal officers to execute these laws just as they are executed in the various states and territories of the Union. That there should be a provision for a federal judiciary in the island, with the same kind of jurisdiction which is exercised by the circuit and district courts of the United States, and that jurisdiction to review their determinations should be vested in the Supreme Court of the United States, or in a designated circuit court of appeals and the Supreme Court of the United States. That there should be a form of local insular government provided which shall have complete control over the rights, property and obligations of the people of the island, substantially covering the field covered by the government of our respective states, and subject to limitations prescribed by congress of the same character as the constitutional limitations generally imposed upon our state legislatures.

Framework of the Plan.

The framework of this government should be substantially as follows: A governor, to be appointed by the president of the United States, with the advice and consent of the senate; the chief officers of state customary under our system, such as secretary of state, attorney-general, treasurer, auditor or comptroller, superintendent of public works, and superintendent of education, to be appointed in like manner, and a legislative council, to be composed of the chief officers of state and a minority selected from the people of the island by the president. That all acts of the council should be subject to the veto power of the governor and to be passed over the veto by a two-thirds vote, and no law should take effect until it has remained without disapproval for thirty days after presentation to congress, or to the president of the United States if passed when congress in not in session. That there should be a supreme court of the island, composed of judges appointed by the president with the advice and consent of the senate, and having appellate jurisdiction only; trial courts in separate districts, having general original jurisdiction, with judges and officers to be appointed by the governor, and a petty court in each municipality; that the several municipalities now existing in the island, with such consolidations and alterations of boundaries as the council shall prescribe, shall be governed by mayors and municipal councils, to be elected by the people of the municipalities, each municipality to be free from control in the exercise of the powers of local government, except as it shall be controlled by statute, and except as its officers shall be liable to removal by the governor in case of failure to faithfully perform their duties, and with power in the governor, in case of such failure, to order a new election and to fill vacancies in the meantime.

Legislature.

The question whether there might not now be provision made for a legislature elected by the people of the island is not free from doubt, but in view of their present inexperience it would be better to postpone such a provision until the people can have had an opportunity for exercise in municipal government, and until the first formative period of adapting the laws and procedure of the island to the new conditions shall have passed under the direction of a council composed of Puerto Ricans selected for their known capacity and wisdom, and Americans from the states competent and experienced in dealing with legislative and administrative problems. The constitution of such a legislature should be contemplated as a step to be taken in the near future.

Wherever it is necessary to employ Americans, except in the chief offices, a system of civil-service examination should be provided, under which requests from the governor of Puerto Rico for suitable persons to be appointed may be filled.

The answer to the question, "What shall be the treatment of the municipal law of the island, and how far shall the laws which now regulate the rights and conduct of the people be changed to conform to ideas which prevail among the people of the United States?" presents little real difficulty. The civil code established by Spain for Cuba, Puerto Rico and the Philippines, and in force at the time of the cession, is an excellent body of laws, adequate in the main and adapted to the customs and conditions of the people. It should be continued in force with such gradual modification as experience from time to time suggests to those who are actually engaged in enforcing it.

Congress has the legal right to regulate the customs duties between the United States and Puerto Rico as it pleases; but the highest considerations of justice and good faith demand that we should not disappoint the confident expectation of sharing in our prosperity with which the people of Puerto Rico so gladly transferred their allegiance to the United States, and that we should treat the interests of this people as our own.

CUBA.

The object of the present government is to give protection to the people of Cuba, security to person and property, to restore confidence, to encourage the people to resume the pursuits of peace, to build up waste plantations, to resume commercial traffic, and to afford full protection in the exercise of all civil and religious rights. To this end the United States has endeavored to work through the channels of civil administration, with the preservation of the civil and criminal laws of Spain, modified from time to time as the interest of good government demanded. Immediately upon assuming his control of the island, General Brooke began the formation of a civil government—not such as we Americans might choose, but one suited to the character and customs of the people. At the same time he confirmed in office all the Spanish appointees. This was a disappointment to Cubans, but it was necessary, for it prevented a scramble for office and a tangle in administrative affairs that would have been hopelessly confusing.

With his civil government formed, the **Military Governor** began, slowly, and with a conservatism that was utterly incomprehensible to the fiery Cuban character, to reach out upon all sides, perfecting his system, as outlined by himself and his advisers, and rectifying wrongs as they came to his notice. Civil governors for the various provinces were appointed, and the provincial deputations, which had been advisory to the governors, were abolished. The first act was a concession to what might be called the province or states rights idea, made because it had been part of the old system. The second was a step in counter action, in order that he spirit of sectionalism might not grow oo strong in so small a country.

The question of

Taxation

vas taken up, and a complete revision of ll assessments was made, at the cost of mmense labor. The outrageous imposts f the Spaniards were in many cases ntirely abolished, and in others so owered as to come within the range of ight and reason. Municipalities which vere hampered by suits for debts saddled ipon them by the Spaniards for war puroses were relieved by an order preventng civil action, until some plan of ettlement could be determined upon, nd many taxes which had formerly gone o the state were turned over to the unicipalities, that they might meet their bligations as they occurred under the ew régime.

Courts

ere stopped from prosecuting persons harged with committing crimes during he war while in actual military service, r no sooner did the Americans come to power than all sorts of private reenges were plotted by both Spaniards d Cubans through the instrumentality corrupt courts.

The control which we are exercising in ust for the people of Cuba should not , and of course will not be, continued y longer than is necessary to enable at people to establish a suitable governent to which the control shall be transrred, which shall really represent the ople of Cuba and be able to maintain der and discharge its international oblitions. When that government is estabhed it will be its duty and right to solve

The Problems

r Cuba. Our present duty is limited to ving every assistance in our power to e establishment of such a government, and to maintaining order and promoting the welfare of the people of Cuba during the period necessarily required for that process.

Before long it is believed that, the results of the census having been computed and tabulated, we shall be ready to provide for municipal elections, which will place all the local governments of the island in the hands of representatives elected by the people, and that when these local governments thus elected are established they will be ready to proceed to the formation of a representative convention to frame a constitution and provide for a general government of the island, to which the United States will surrender the reins of government. When that government is established the relations which exist between it and the United States will be matter for free and uncontrolled agreement between the two parties.

It cannot be doubted that when the question of

Future Relations

between this country and Cuba comes to be considered by the representatives of the two countries the United States will deal generously in all respects with the people for whom she has made such great sacrifices. It does not seem that, so long as we retain control of Cuba and preclude her people from making trade agreements or treaties on their own account, we ought to treat her sugar producers less favorably than we do their competitors in the West Indian islands which are subject to other powers, and it has been recommended that during the period of our occupation of the island the duties imposed upon the importation into the United States from Cuba of the products of that island be reduced to the same rates which will be imposed upon the goods imported from Jamaica in case the senate shall ratify the pending reciprocity treaties.

Since the Spanish evacuation there have been no strictly military operations, and the officers of the army in Cuba have been largely occupied in conducting, under the direction of the military governor and the department commanders, a general civil administration, for which no other governmental machinery existed, and in aiding the existing municipal governments in the performance of their duties.

THE PHILIPPINES.

Claim to government by insurgents in the Philippines can be made no longer under any fiction. Its treasurer, secretary of the interior, and president of congress are in our hands; its president and remaining cabinet officers in hiding, evidently in different central Luzon provinces; its generals and troops in small bands scattered through these provinces, acting as banditti, or dispersed, playing the rôle of "amigos," with arms concealed.

Since that time our troops have been actively pursuing the flying and scattered bands of insurgents, further dispersing them, making many prisoners, and releasing many Spanish prisoners who had been in the insurgents' hands.

It is gratifying to know that as our troops got away from the immediate vicinity of Manila they found the natives of the country exceedingly friendly, and both men and animals were able to live upon the country and for considerable periods leave their supply trains behind. Wherever the

Permanent Occupation

of our troops has extended in the Philippine Islands, civil law has been immediately put in force. The courts have been organized, and the most learne and competent native lawyers have bee appointed to preside over them. A system of education has been introduced an numerous schools have been established It is believed that in the city of Manila greater number of good schools, affordin better facilities for primary instruction exists to-day than at any previous time i the history of the city.

The commissioners appointed by th president to study the government of th Philippines have returned, and ere long congress will take up the question o replacing the military with a civil government.

THE HAWAIIAN ISLANDS.

For a considerable time after the quee of the Hawaiian Islands had been depose from her throne the liberal party in th islands, made up largely of American and Europeans, repeatedly petitioned th government of the United States fo annexation. Early in 1898 the provisiona government sent to this country a commission to bring about the desired junction of the two governments. Debat was hot in congress for some time, and several treaties were drawn up and pending. Upon the explosion of the Maine i the harbor of Havana, however, th administration was so aroused that as war measure it was decided to annex th islands. Accordingly, June 11, 1898, th house passed a resolution by a vote of 20 to 91 to take

Possession of the Islands

ceded by the provisional government, th senate concurring July 6, by a vote of 4 to 21. August 12, this governmen officially lowered the old Hawaiian flag and set our own stars and stripes ove the government buildings, and administered the oath of allegiance to the national ard. The resolution under which the ands were annexed stipulates that ntil congress shall provide for the govnment of such islands, all the civil and dicial and military powers exercised by e officers of the existing government in d island shall be vested in such person persons and shall be exercised in such nner as the president of the United ates shall direct." The existing treaties th foreign powers were to cease, and replaced by those of the United States; nicipal legislation not inconsistent th the resolution or with the constitun of the United States was to remain force until congress acts; customs ties were to remain in full force; the blic debt was to be assumed by the ited States, not, however, to a sum greater than $4,000,000. The Chinese were at once barred from further immigration.

A Joint Commission

was to be appointed by the president to study the laws and customs of the islands, and report to the congress of the United States for legislation. For this purpose $100,000 was appropriated by our government, and President McKinley appointed Senator Cullom of Illinois, John T. Morgan of Alabama, Representative Robert H. Hitt of Illinois, Ex-President Dole of Hawaii, and W. F. Frear of Hawaii, as the joint commission. This commission studied the nature of the islands, and from their reports congress will soon enact new methods of governing our new possessions.

STREET SCENE IN HAVANA

TRAVELING IN THE AIR

MODERN SCIENTIFIC KITES AND FLYING MACHINES.

Wonderful development toward solving the problem of Aerial Navigation. Travel through space at enormous speed assured in the near future.

SCIENTISTS and mechanical engineers are looking for some one to bring to perfection a pactical flying machine or air ship. They no longer laugh at the idea that earial flight is a possibility, but instead say that it is not only a possibility but a strong probability. The reason for this is that a number of men have been steadily experimenting for the last decade upon kites, aeroplanes and balloons, with the idea in view of being able sometime to direct them at will. Otto Lilienthal, a German inventor, came as near, perhaps, to perfection as any one yet, while Maxim, the gun inventor, has been to some extent successful. The latter built a machine eight feet wide and forty feet long, which by propulsion by screws made a number of flights.

Lilienthal's Method

not only was successful in propelling to some distance a machine through the air, but also carried its inventor. His outfit consisted of several large "planes" made of light wooden frames covered with cotton cloth, the whole apparatus much like four outspread wings of a huge bird. They were in two sets, one above the otl connected by vertical rods, and at l back between the two extended a la cloth-covered rudder, which also horizontal planes. The operator h on to the lower set, clasping levers to wings by his hands, while at the sa time he was supported by cushions un his arms, thus leaving his legs free a dangling in the air. The affair weig from thirty-five to fifty-five pounds, a was intended for jumping from a h tower, somewhat after the style of a pa chute, only as the flyer started off i space he might work the levers, which turn manipulated the planes, and sent h shooting out at an angle, or soaring again or around in circles, just like a bi

Near Berlin, Lilienthal built a tow about fifty feet high on a hill, and fro this he sailed as far as six hundred feet easy winds, sometimes against hea winds, and on several occasions reached a height greater than that fro which he started. These experiment though they advanced the science of aer nautics, at last resulted in the invento death by collapse of his machine.

Professors Chanute and William Pa

ne years ago conducted a series of roplane flights at Dunne Park, Indiana, the shores of Lake Michigan, which re in the main successful. No motive wer was used, the principle being that slide down hill would lift the plane a stance into the air, and then by other ınes and rudders, the machine was pt in the air for some time.

Paul has also invented one of the most rfect tailless kites of late years. It is lled

The "Fin" Kite,

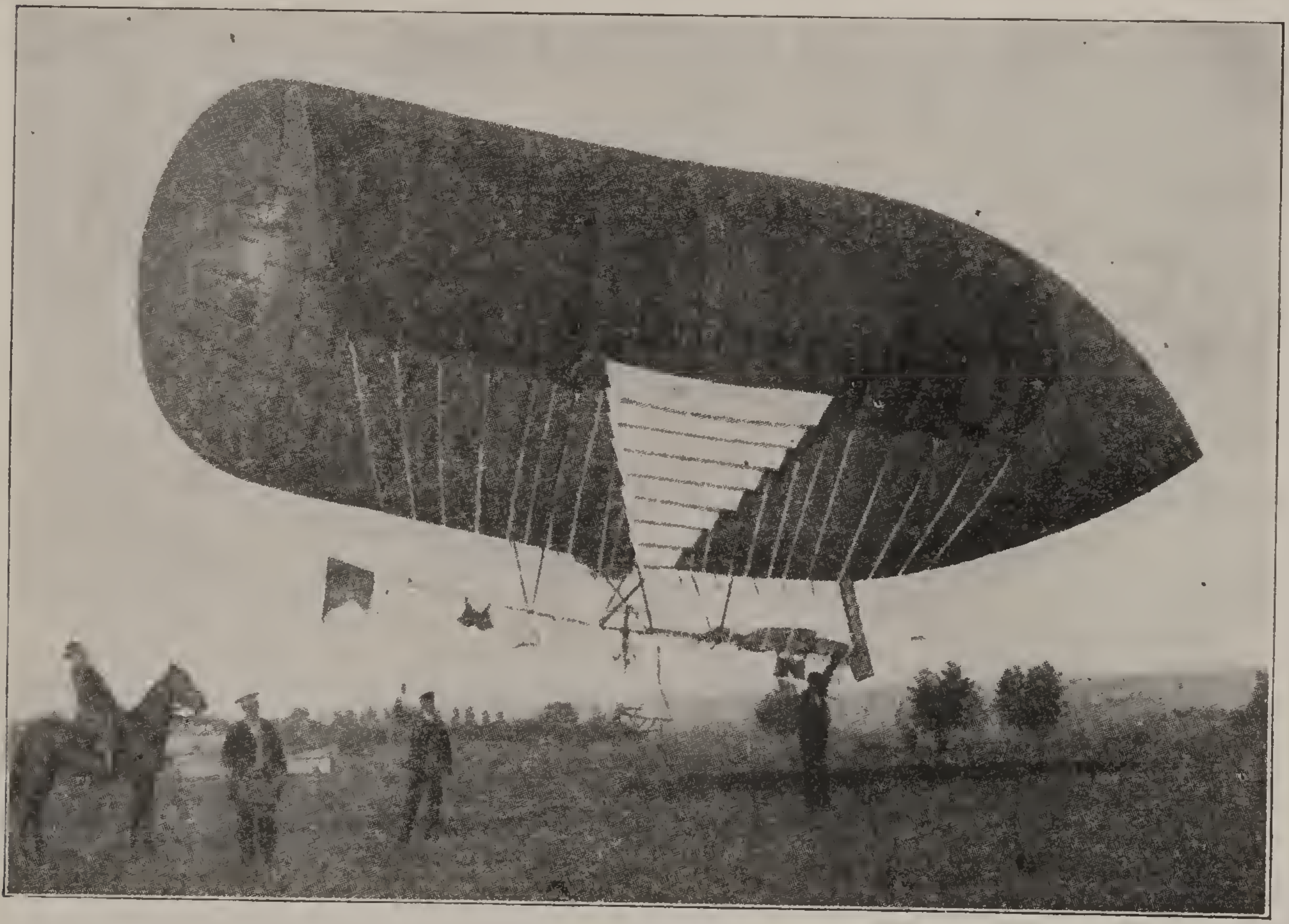
d consists of two planes, one intersect- g the other at right gles, so that there are esented to the wind ır fins, two lateral, e at either side, and o perpendicular, one ove and one below. ıe connecting band is tached at the ends of e perpendicular fins, d when the kite is ised it exerts a very werful pull, and has rdly any wavering otion. Heavy logs ve been pulled across ake Michigan in tow the kite, and the ventor contemplates a yage himself in a nall iron open boat.

Probably the best experiments, or ose that have borne the most useful sults, are those made by the war de- rtments of this country and Europe. ıe use of the kite has been remarkable past years. Franklin by its aid drew ectricity from the clouds; Peacock agged a little carriage by one, and hers have suggested life-saving appa- tus with kite connection. But it has ally been only in recent years that huge kites have been constructed with the sole purpose of experiment.

The great variance in wind pressure under different conditions makes it rather difficult to figure accurately on flights. Tails for a long time were considered necessary, but of late years this hindrance was done away with. The fact that tails were not necessary was discovered purely by accident. A famous kite-flyer had built a huge affair of 500 square feet with an immense tail of brush. At the first attempt at flight the tail became entangled in a tree. The kite came to ground, and the disgusted maker resolved to try another tail, when a gust of wind came along and took it up in the air, where it flitted about unsteadily, but rather successfully, though without an appendage.

A GAS-KITE BEING PROPELLED THROUGH MID-AIR.

The material for building is varied, sometimes the frames are made of bamboo, sometimes of metal, while the sails are often made from silk or cambric cloth, and sometimes even heavier material. The most successful flyers operate several kites from one rope, thus giving great lifting power. Captain Baden-Powell, of the Scotts Guards, rigged up a series of five kites and attached a balloon basket to them which would lift two men to the height of 100 feet. Photographic apparatus has been attached to kites and bird's-eye views of the earth taken by manipulating strings from the ground. Pictures of birds in flight have also been made in this way. In large cities flags and advertising banners are flown from the supporting string, and in signal service corps occasionally signals are sent to distant camps by their means.



DANILEWSKY'S DIRIGIBLE FLYING MACHINE.
Showing wings and the bag inflated ready for a flight.

For years,—in fact, ever since the balloon was developed into a man-carrying flyer,—plans have been laid to make it so that it can be propelled and directed at the will of the operator. Huge cigar-shaped bags filled with gas have been floated to which were attached baskets of some sort containing propelling machinery and rudders. The general plans that seem to be followed the most are th which call for large planes or wings constructed that they will help to supp the ship, and also guide it by extendi great enough surfaces so that conflicti winds will not beat them about. Scr propellers above and at the rear a generally used to draw the ship about.

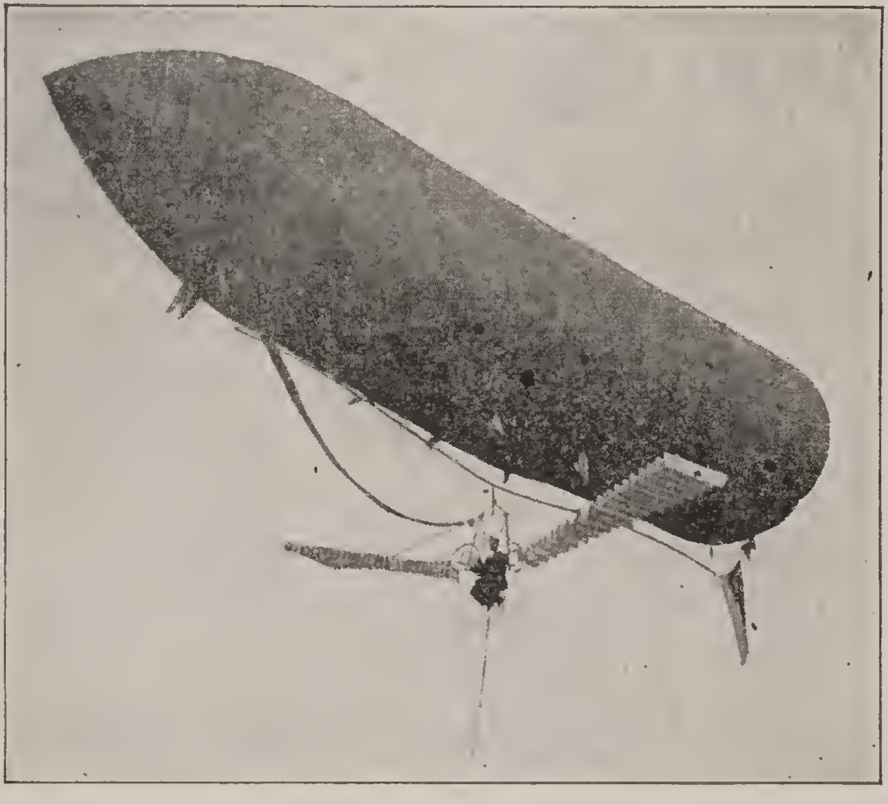
The latest improvement in the line **War Balloons** comes from Germany. That count took no interest in ballooning till 188 whereas her tradition enemy, France, beg investigations in t science of aeronauti at once after the war 1870. However, Ge many has made rap strides in her exper ments, with the resu that the United Stat government is now bu ing one of the rece productions of her skil The balloon in questio is the invention of Ca tain von Parsval, Bavarian, and Firs Lieutenant Sigsfeld, Prussian. Hitherto th wind has been the grea est difficulty to over come in this science. Even a moderate wind was sufficient t depress the ordinary bullet-shaped ship, the result being that it could not moun high, and was thus practically useless fo military purposes. To surmount th wind difficulty, therefore, this ship ha been made of great length, and of such nature that it rises in the air on a slant, somewhat like a kite. This odd feature has given the device the name of the "dragon" balloon. The main bag is filled with a buoyant gas which keeps the ship afloat, while at the rear and below it is a sack-like arrangement which is open to the wind, allowing it to pass through an aperture in the back, thus steadying in a great measure the balloon against heavy gusts of wind. The basket is hung to the rear end, and from it are run cable and telephone wires, thus weighting that end and keeping the whole ship in the air at an angle of 20 degrees to the horizontal. Ingenious devices are arranged inside the bag for keeping the pressure the same upon the sides at all times, this having been one of the greatest difficulties to overcome. At the sides of the bag are fins which in a great measure protect it from upward wind currents. A cable through which run insulated copper wires for telephone and telegraph communication, holds the balloon to earth and is reeled from a cylinder on a wagon. When the huge ship rises in the air, it can stand steadily in almost any direction desired, and in the face of heavy gales does not fly about. The benefits to accrue from such a contrivance are many; battles may be viewed from a distance; explosives dropped on the enemy, though this is prohibited in civilized warfare; fortifications inspected and photographed, and similar manœuvres.

Use of Liquid Air.

With the help of the motive power of the newly-discovered liquid air we may expect to have some sort of a dirigible airship before long.

Even now this expectation appears to have been fulfilled. Under date of July 13, 1901, the following account was transmitted from Paris:

There is scarcely room for even a shadow of doubt that M. Santos-Dumont has definitely solved the problem of aerial navigation. During a couple of hours yesterday morning he conclusively proved this by steering his new 'aeronef,' the Santos-Dumont, No. 5, through the air in every direction, north, south, east and west, turning to the right or left, wheeling round in wide circles above the Bois de Boulogne, and finally sailing off to the Eiffel Tower, near which a trifling accident to his rudder necessitated a momentary descent.



FLYING.
The wings being raised in mid-air and being propelled by occupant of the ship.

The accident only showed the more unmistakably the practical utility of M. Santos-Dumont's astounding invention. The airship came to earth as easily and lightly as a bird, and when the defective steering rope connected with the rudder had been repaired, it ascended again, made a complete turn upon itself and returned to its starting point, the Parc d'Aerostation, at St. Cloud.

M. Santos-Dumont had kept very secret his intention of making the ascension. It was impossible to fix a day or hour beforehand, he said to me last evening at the Aero Club, in the Rue du Colisée, an association that does a vast amount of practical and invaluable work to advance ballooning in France.

"Perfect weather," he said, "is desirable for the first experiment. I have slept at the Parc d'Aerostation for the last two nights so that I might be ready to go up at the first favorable moment. Wednesday night was unsettled, and even last night a storm, luckily of brief duration, threatened to make a postponement of the ascension inevitable. However, it quickly blew over and a dead calm set in, so I decided to make the ascent.

Marvellous Achievement.

"My balloon was got out of the shed, and right after three o'clock the trial began.

"It appears," he added, with characteristic modesty, "that it was successful."

If M. Santos-Dumont was content with merely expressing satisfaction with the results of his experimental ascension, M. Emmanuel Aimé, a distinguished professor of sciences and mathematics and secretary of the Aero Club, was wildly enthusiastic.

"It is marvellous!" he exclaimed, again and again. "It is the one practical, really practical, attempt to make a dirigible balloon that has been an unqualified success."

M. Aimé is accepted all the world over as an authority on aerostation, and his opinion of the trial is consequently of the greatest value. This is what he wrote:

"During the last fifteen years no one in France, with the exception of M. Santos-Dumont, who came direct from San Paolo to Paris for the express purpose, has made an ascent in a really steerable balloon; that is to say, in a balloon provided with a motor and propeller. Thanks to the perseverance and tireless activity of M. Santos-Dumont, who was the first to utilize in aerial navigation the light motor used in automobiles, a practicable solution of this stupendous problem has just been found.

Skill and Judgment.

"To do thus, to create what may now be called the art of areomatics, nothing less than the experience, practice and remarkably cool judgment and self-possession of M. A. Santos-Dumont was absolutely necessary. For it did not suffice to build a navigable ballon. The more difficult thing was to make the ascension in it.

"From this point of view," continued M. Aimé, "the value of the man adds so materially to the value of the system that it was not hazarding too much to predict boldly the decisive success that has crowned M. Santos-Dumont's trial trip to-day.

"The balloon with which the experienced aeronaut experimented is the fifth of a series that he has constructed, each carrying out in a more highly developed form the idea that forms the basis of the system. Its principal characteristics are: Diameter, 11 feet; length, 103 feet; four-cylindered petroleum motor, 16 horse-power, propeller screw measuring 4 mètres from blade edge to blade edge, and making 200 revolutions per minute. The machine is supported by a triangular framework made of aluminum and strengthened with pine, measuring nearly 60 feet in length. It is formed of three curvilinear scantlings bound together and joined with aluminum, united by wooden crosspieces and solidified by an ingenious network of piano wire.

"At a distance of 22 feet from one xtremity of the framework in the centre f a triangular section, the motor is sus-ended by means of piano wire that causes to bear a vague resemblance to a gigantic pider in its web. At the same distance om the other extremity is situated a asketwork car, in which the aeronaut takes is place, and where he commands the rrangements for lighting the motor and r starting the screw propeller. Cords ork the rudder, controlling the escape alves and regulating the displacement of e guide rope from bow to stern, if I may se the term, by means of fine cords. The amework, with its motor and aeronaut's ar, is suspended to the balloon by steel ires of such tenuity that they are invisi-le at a distance of 150 feet in the air.

"Let Go."

"At three o'clock in the morning the alloon was guided during a period of per-ct calm from the Parc d'Aerostation, at t. Cloud, to the Long Champs race-course, d was given final touches in the pres-ce of M. George Besancon, director of e 'Aerophile,' the organ of the Aero lub and of French aerostation, M. ustave Hermite, several officers from ersailles and Mont Valerian and myself. he words 'let go!' were uttered by M. antos-Dumont, who was alone in the car the balloon. There is not room enough it for an aeronaut much bigger than its esigner.

"The words were the signal for the com-encement of a series of experiments of e most conclusive character, which sur-assed in importance any that have been ade from the days of Montgolfier up to e present time. Six consecutive times the aeronaut made a complete circuit of the Long Champs race-course.

"It was proved that the airship has an average speed of 24 miles per hour; that it answered its rudder with most perfect obedient docility, and that the problem of landing was solved, each voyage round the race-course rigorously ending with a descent at a spot indicated beforehand. It returned time and time again to the previously designated spot, just before the tribunes, with mathematical precision.

Sailed Away.

"When M. Santos-Dumont had accomplished all these evolutions he turned the head of his balloon in the direction of Puteaux and sailed off to that place. Then he turned round sharply and came back to the starting point before the tribune.

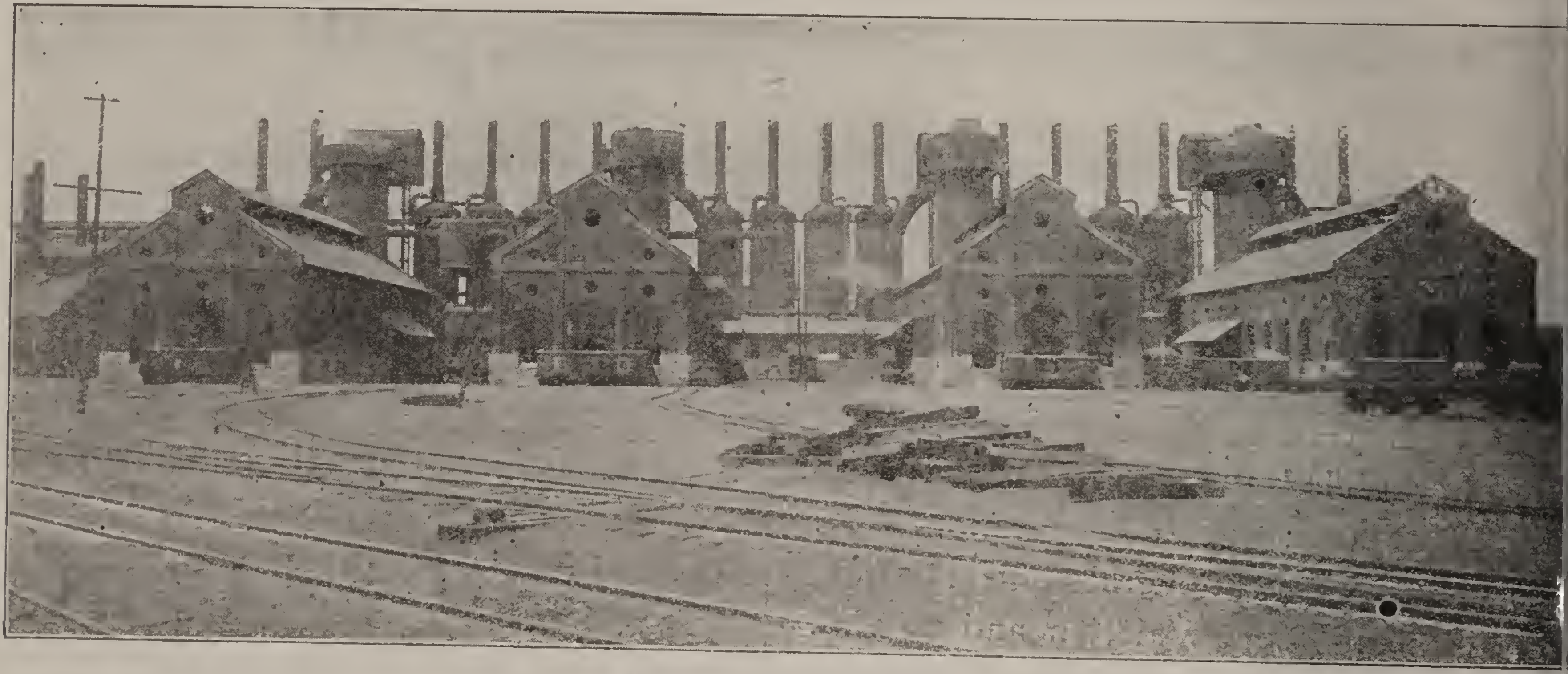
"After taking in a fresh supply of petroleum, he made off toward the Eiffel Tower and reached it, at a distance of three miles in ten minutes. While over the Champ de Mars a slight accident to his rudder compelled M. Santos-Dumont to come down in the Trocadero Gardens. A tall ladder was very obligingly brought by some workmen and M. Santos-Dumont climbed up it to repair the defective part. When this had been done he started off again swept completely round the Eiffel Tower and came back at a breakneck speed to the tribunes on the Long Champ race-course, in order to reassure his friends who were alarmed at his long disappearance.

"Including stoppages, the voyage lasted one hour and six minutes. After a little rest, M. Santos-Dumont started off toward the rising slope behind Longchamp, crossed the Seine and brought back his airship to its home port.

STEEL ROLLING MILLS.

From crude iron ore to shining steel rails. How work is done in one of America's greatest industries. Millions made and invested in nature's great product.

NIGHT is the time when one should watch the process of converting crude iron ore into the long black steel rails that are destined to span the country. No display of fireworks can equal the grandeur of the great crucibles vomiting forth their masses of fiery metal. Many times the glow on the sky from these great mills can be seen great distances, and the reflection on the clouds often resembles a mountain on fire. The work in these rolling mills is hard in its nature, and to some degree dangerous, yet the workmen love it and take a pride in the fi little scars that seam their breasts, t result of their working stripped to t waist in a shower of sparks.

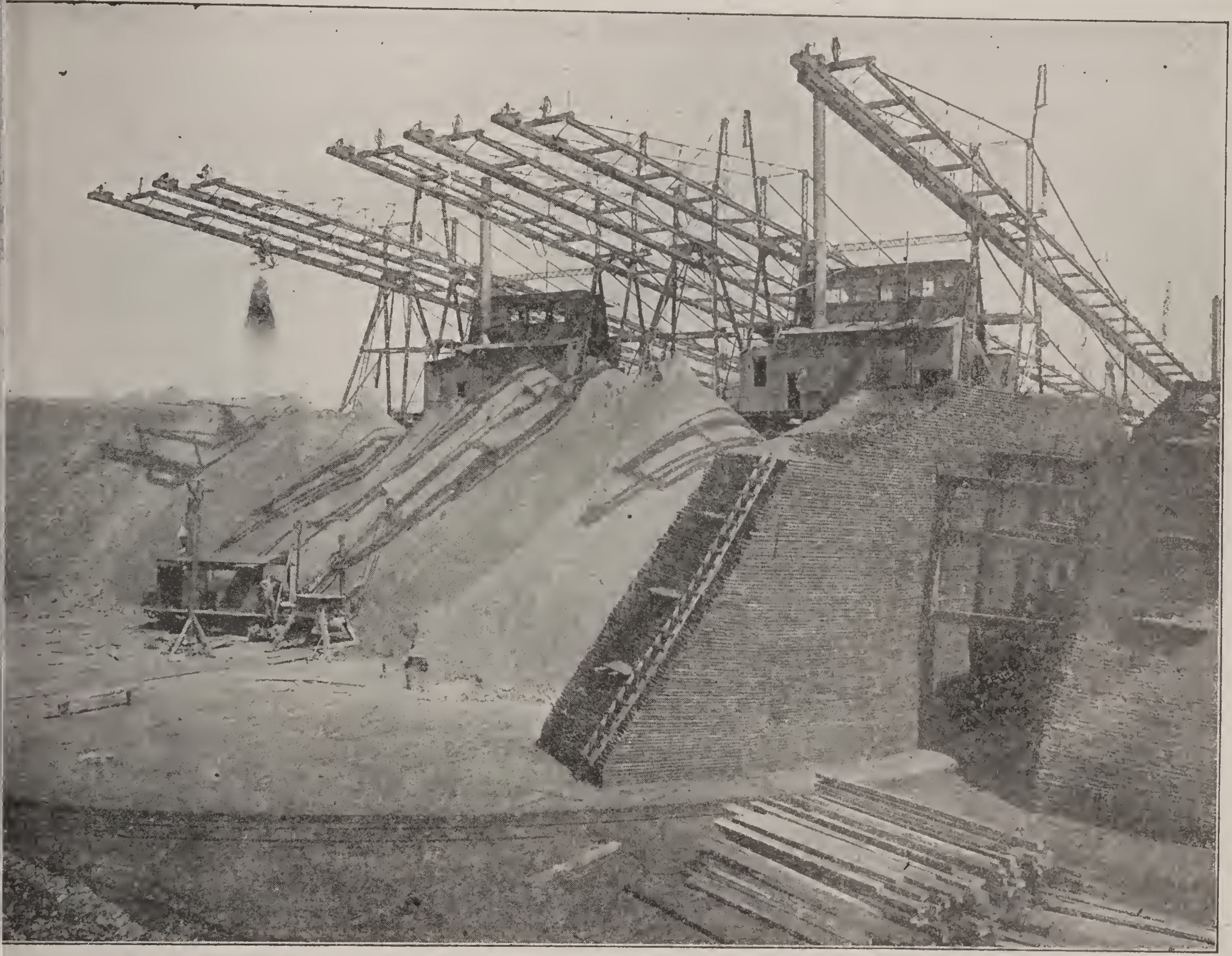


BLAST FURNACES.

The towers with the cupolas are the blast furnaces. Between the blast furnaces are seen the hot-a furnaces, of bottle-like appearance. Inside the four buildings (each one connected with a blast furnace are cast the steel billets and ingots, which are later run through the mills and rolled into plates, rails or rod

When a load of ore arrives from t mines it is brought up on side trac where men with wheelbarrows can easi cart it down to the melting room. Thi is a great roomy place with no walls t speak of, and nothing but a sand floor In one end of the room, reaching high u in the air, is the "cupola." In som mills this is fifty feet high. It is cylin drical in shape, like an enormous boile t up on end, and is lined with firebrick. he bottom has a sand bed, and just bove this enters a blast pipe through hich rushes the current of air that is to ake the fire "blow." At the top of the pola is a stack out of which the smoke d gases escape, and a little lower down, nning around the cupola, is a platform led the "charging floor." An opening the cupola even with this floor is called charging "door," and it is here that ore, coke and lime are dumped in en a melting is to take place. At the ttom of the cupola are a tap hole and a out at which the molten metal runs out, and just above these and running around the base are a number of holes or slits, called "tuyeres," surrounded by a wind box. This wind box is attached to the blast pipe and aids in the "blow."

The Cupola man starts a fire of kindling wood and coke, and when he has it going well he dumps down through the charging door alternate loads of coke, lime and iron ore. When the cupola is nearly full and the blast is working well, the cupola man sits down with his pipe, to watch. Gradually the ore is heated through and begins to yield; and here comes in the use of the



UNLOADING IRON ORE.

This picture shows the trams over which the ore is carried in large buckets from the ships and dumped o the ore pile within the yards of the steel works. From these great heaps the ore is later taken to the st furnaces for conversion into pig iron.

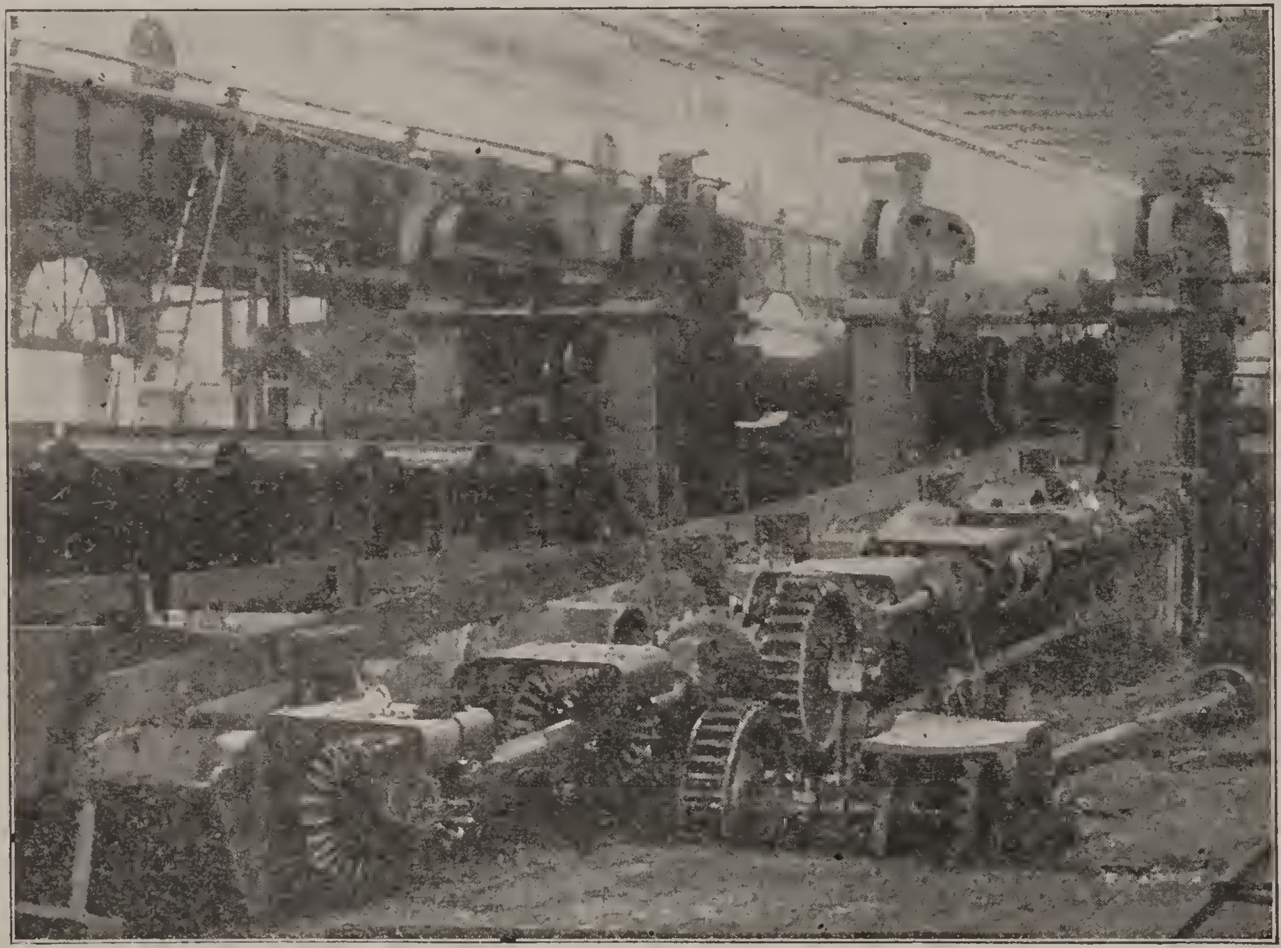
lime. Many impurities, especially sulphur, are in the ore, which, if not removed, would make the iron too hard or too soft. The lime seems to have an affinity for these substances, and as the ore melts it takes them up, together with particles of the coke, and lets the melting iron run down to the sand bed at the bottom. At the tap hole, just above the wind box, is an opening covered with mica, where the process of melting can be watched by the cupola man. When he sees the first sign of dripping, he plugs the tap-hole up with clay, and then waits a little longer till he is ready to unload.

In the meantime men have been preparing the sand floor of the room into long troughs, one leading from the other, and all joining in one main trough that ends just under the spout of the cupola. Now the charge is full, and a man with a big mallet strikes the plug of the spout a blow. Out rushes the stream of fiery metal into the troughs to cool. Men wh great wooden sabots for shoes, or boa ls on their feet, run about among e troughs and cover the iron with sa As it cools somewhat by streams of wa being thrown on the sand, these men r along over the iron and break it i short lengths or "pigs." These p may be shipped to foundries or ot mills for casting.

At the steel mills, however, much of t iron is not cooled i pigs, but drawn off i little brick cars and c ried at once to t steel-converting cru bles, thus saving a s ond heating. The c run along rails t carry them right up the top of another c pola-like affair. He the iron is poured i and a

Tremendous Blas

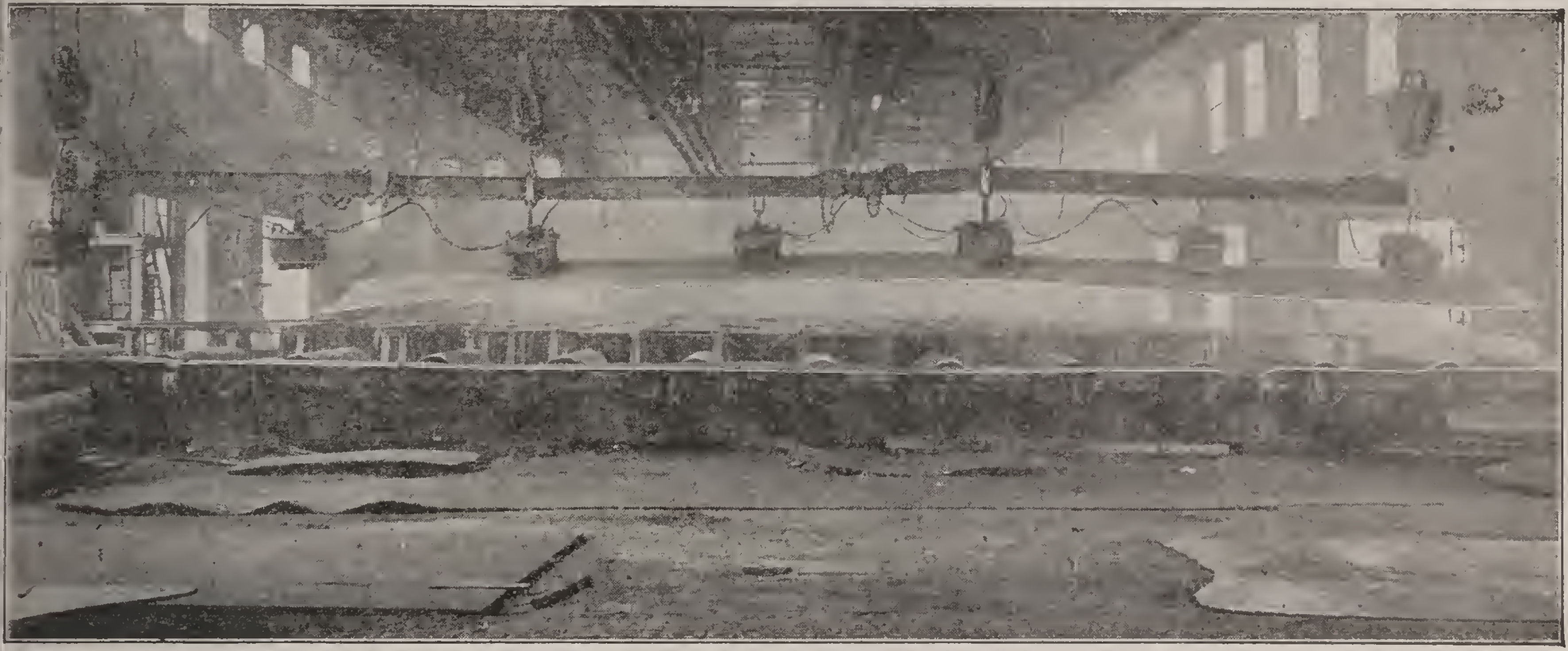
set going. Sometim oil is used to get t desired heat. Then man comes along wi a ladle full of "spieg eisen," which is a co bination of carbo manganese and oth chemicals that wor the great process of changing iron in steel. There are three grades of ir product: malleable or wrought iron, whi is simply iron as we know it in pig steel, which is iron with an addition 1 to 1½ per cent of carbon; and cast iro which contains about 4 per cent of carbo The more carbon added the harder a more brittle the substance become When the carbon has been poured in, t blast spouts up for a while longer, a then the cupola, which is hinged, ti



A STEEL RAIL MILL.

The steel ingot passes back and forth between the sets of immense rollers until it is finally delivered, at the left of the picture, a perfect steel rail, ready to do its part in the transportation of the world's products.

ver and with a shower of sparks the bright ed steel flows out about as thick as tar nto big oblong molds set on the sand floor, vhich, however, have only four sides and o top or bottom. There are generally a lozen or so of these molds full of glowing teel arranged in a circle on the floor vaiting to cool. When their contents are ufficiently cool to handle, the molds are icked up by great cranes and tongs, and wung over to brick-covered cars. Here the steel "ingot," as the lump is called, is knocked out of the mold, and sent on its way to the rollers, while the mold is dropped back to its place to receive another charge.



MAGNETIC TRAVELING CRANES.

Some steel plates are so large that they cannot be carried by hand ; consequently powerful electro-agnets are so arranged that—by the simple push of an electric button—they descend, and, grasping the ugh plates, convey them to any part of the mill desired.

In Making Steel Rails,

numerous rollers, each a little smaller than the one before it, are arranged in successive rooms. The red-hot ingot is dumped from its car on to a continuously ravelling bed with arms sticking up from s chains. These pick up the ingot, and ith the aid of a man who pushes with a rowbar, the mass of metal is run between wo great rollers and reduced in width and hickness but greatly lengthened. This rocess is repeated again and again, each me the size diminishing one way but ncreasing another. Finally the rail begins take on a shape, with flanges at the ottom and T-shaped head. Then the ame of the mill is stamped in and holes are punched in the sides, so that they may be handled better when laid on the tracks. Then comes the sawing apart, by highly tempered saws lubricated with oil. The rail is gradually cooling all this time, and as it cools it warps. To overcome this it is placed in vises and straightened. The time occupied from the moment the hot iron metal leaves the ore-refining cupola till it is formed into heavy, perfect rails is, in a rush season, but a few hours.

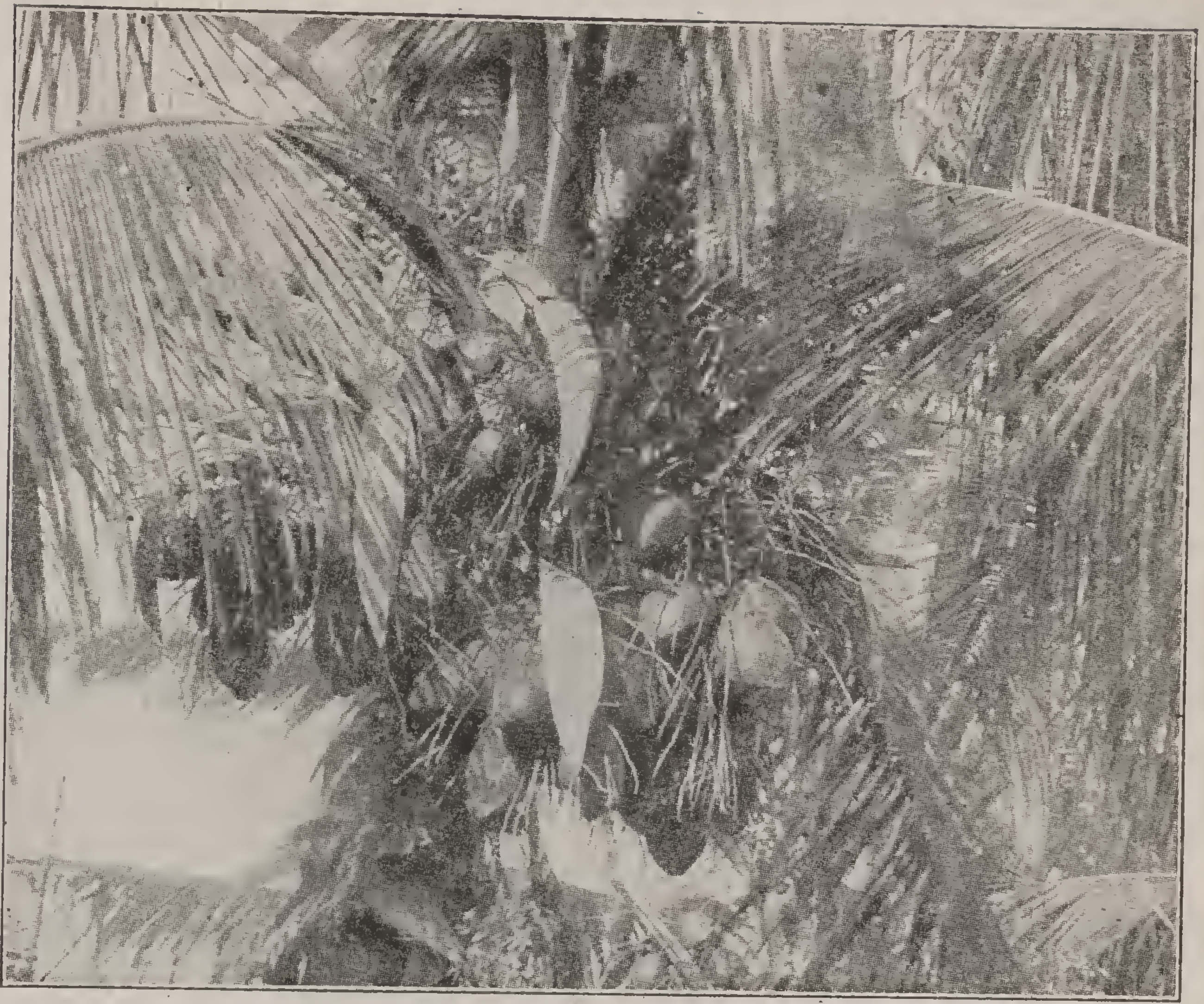
PHOTOGRAPHY IN 1901.

PICTURES OF LIGHTNING, ELECTRIC SPARKS, OBJECTS TOO SMALL TO BE SEEN, AND OBJECTS AT A DISTANCE FAR BEYOND THE REACH OF THE HUMAN EYE.

IN the last few years many important inventions have been made in photographic circles. The X-rays are used in methods peculiar to the realms of photography. New sensitive papers have been introduced, especially the rough gray platinum kinds that give the effect of steel engravings. More improved plates for making exposures have given results never before dreamed of. Beautiful pictures of the heavens and nature are the result. Among other odd subjects for the camera are the lightning flash and electric sparks. Meteorologists have been much interested in the results of pictures of lightning, and among other conclusions arrived at regarding these familiar electrical discharges is that they are crooked as they appear, and not, as some would have us believe, straight with

VIEW OF A COCOANUT-TREE TAKEN WITH AN ORDINARY CAMERA AT A DISTANCE OF 200 FEET.

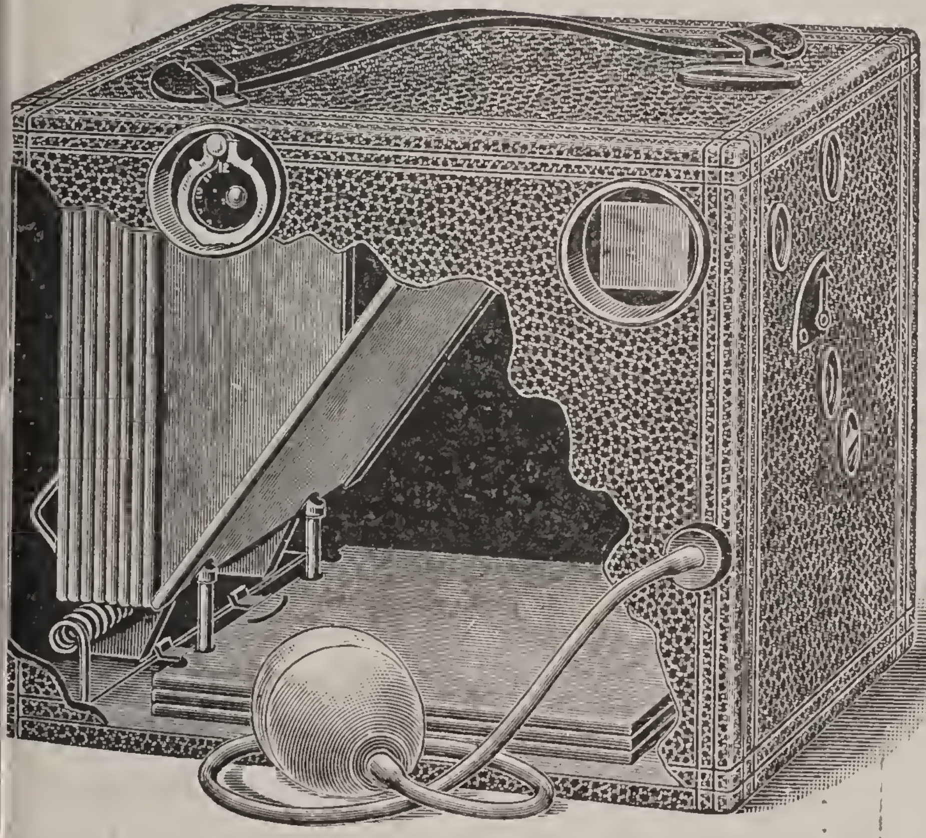
a crooked effect from the background of clouds.



COCOANUTS ON THE TREE. VIEW TAKEN WITH TELE-PHOTO LENS, SAME DISTANCE.

Electographs,

or pictures of electric sparks, are of great interest to scientists. These are produced by exposing a sensitive photographic plate to the path of a spark jumping from the poles of a static machine. The plate is enclosed n a dark envelope, and placed between the poles of the machine at right angles to a ine that would connect them. The spark eaps out, punctures the envelope, exposes the plate, and rushing over the edge of the plate, leaps across through the air to the other pole.



One of the latest snap-shot cameras, arranged for
rrying twelve plates without reloading. A pres-
re on the bulb operates the shutter which exposes
e plate. Then the little screw at the upper left
nd corner is turned one notch, and the plate is
ropped down on the bottom of the camera, leaving
fresh one at the proper place ready for another exposure.

Some peculiar properties of electricity are thus learned; among others that electricity follows the line of least resistance through its conductor, whether it be air or of another sort, but in so doing it selects a number of special paths mutually divergent from each other, and hence does not travel in a mass through its conductor. From these experiments laws are expected soon to be formulated which govern this freakish fluid.

The Telephotograph.

Many instances arise where, because of the remoteness of the subject to be photographed, the operator secures very poor pictures, with only faint outlines, or at the best very small reproductions. To do away with this difficulty a new process, called telephotography, has come into use. It came about partly through the use of ordinary field glasses and telescope for observing with the naked eye, and later on with photographic attachments to the great glasses in observatories. Now, however, cameras are made that may be carried around from place to place, and yet so arranged that if the view to be photographed is across a wide river, the far-seeing lens is simply adjusted, and the telephotograph made.

AN ELECTROGRAPH OR PHOTOGRAPHIC REPRODUCTION OF THE LEAP OF AN ELECTRICAL DISCHARGE BETWEEN THE POLES OF A STATIC MACHINE.

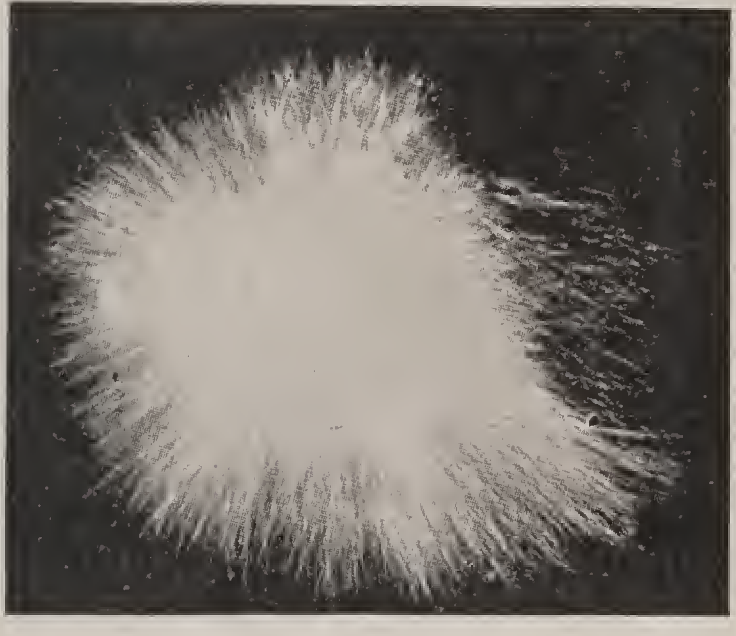
Dwight L. Elmendorf has been as successful, perhaps, as any one in taking views of this kind, and it has been largely due to his work in experimenting with telescopes that a good camera has been developed. An arrangement that he has perfected consists of a rack and pinion lens tube, 3¼ inches long and 1½ inches in diameter, enclosing a fine rectilinear lens, back of which is a small negative c concave lens. The negative lens is th one that does the far-seeing work, for magnifies the object. This lens may b taken out if desired and the camera use for ordinary exposures. After a commo picture has been taken, the operator ma replace the negative lens, and upon hi ground-glass screen will be seen the sam **subject, only a** great deal nearer an larger. If the outline is not quite dis tinct, by using the rack and pinion th regular lens may be moved forward o backward similar to an opera glass, and perfect focus is obtained. Exposure with this kind of camera must necessaril be increased in length of time, for th reason that fewer light rays pass througl the negative lens to the sensitive plate

This seriously retards taking pictures of noving objects at a distance, but ere long t will doubtless be overcome.

The uses to which this process may be ut are various and wonderful. For leasure alone the results are startling. magine yourself in the Alps, desiring to ake a picture of a distant cap of snow niles away. Here is the means of gratiying this desire. In the war between ngland and the South African Republic, he former country used this process for aking pictures of camps and fortifications any miles off, and which could not posibly have been accomplished otherwise han by dangerous risk of fire from the oers' guns. As soon as an apparatus is erfected that will take rapidly-moving bjects, a kinetoscope attachment will be ade that will enable the scientist to take nd reproduce moving pictures of wild nimals in their native haunts, and birds n the wing, long before they become ware of the approach of their enemy.

Microphotography

rapidly coming to the aid of medicine. eretofore it has been doubtful just what onditions existed in diseased tissues, but ow, with camera and microscopes, lastng pictures may be made of life-destroyng germs. The apparatus for such processes is simple, and even inexperienced amateurs may get beautiful results of flowers and animal life. A light tight box is arranged for the camera, with a very long bellows. At the end is attached a powerful microscope, and farther up an ordinary photographic lens. The box must be held very rigid, for long exposures are the rule. When the plate is developed, one may see in great detail tiny objects not visible to the naked eye. These, when thrown on screens from magic lanterns, make beautiful enlargements.



IMPRESSION OF AN ELECTRIC SPARK ON A PHOTOGRAPHIC PLATE.

Recent Occurrences

THAT HAVE MADE HISTORY.

The Rural Postal Delivery; British War in the Soudan; Arctic and Antarctic Exploration; Partition of China.

The Rural Postal Delivery.

THERE is nothing so remarkable in the history of the postal department as the recent growth of the free rural delivery. Within the last two years, because of the wish of the people whom it serves, it has so implanted itself upon the postal administration that it can no longer be considered in the light of an experiment. Some of the advantages derived from it are: Increased postal receipts, more letters being written and received, and more newspapers and magazines subscribed for, thus keeping people in country parts well informed on topics of the day, as well as better educating them. Land values are increased, in general about $2 to $3 an acre, because of better means of communication. Country roads must be improved for the carrying of mails, and here lies a great benefit to the farmer. In one county in Indiana the delivery was valued so much that the farmers spent $2,600 on grading i order to obtain it. Possibly the greates advantage to the country man is bette prices on his produce, because he ca keep in daily touch with the market reports and can take advantage at once o high prices to sell. At the end of 189 rural free delivery was in successful operation over 383 routes, radiating over fort states and one territory. The service wa given to over 190,000 persons at a annual cost of about 84 cents a person This was accomplished by an expenditur of $150,000, which was made available b an act of congress July 1, 1899.

British War in the Soudan.

The fanatically religious Dervishes, followers of the Mahdi and the Khalifa o Soudan, for eighteen years carried on a warfare with the English that was most discouraging to all attempts at civilization. The great Colonel "Chinese" Gordon in 1879 was governor of the country, and tried without success to quell insurrections. He was recalled to England, and at his departure new rebellion against the British authority broke out, headed by the son of a Dongola carpenter named Sheil Mohammed Ahmet, who called himself El Mahdi, the prophet of God. This man gathered under his banner thousands of fanatical Mohammedans, and ravished the country at the sources of the Nile River. England sent Colonel Hicks with 11,000 picked men against him, but the expedition ended in a massacre of the British. England, now awake to the enormity of the situation, sent Gordon back to capture and destroy the Mahdi. In 1884 he arrived at Khartum, was imprisoned, and before reinforcements under Gen. Sir Garnet Wolseley could arrive, had to surrender, and was then treacherously killed by the Dervishes. The Mahdi died the next year and was succeeded by Khalifa Abdullahi, who dispensed with the Mahdi's religious fervor, but lacked none of his wiliness. In 1896 the British renewed the war under General Kitchener, who, in order to carry the war into the enemy's country, built a railway over the desert, advancing as fast as it was completed, thus having a ready communication with civilization for supplies. In 1897 Berber and Abu Hamed were taken, and September 2, 1898, Omdurman, the capital of the Dervishes, fell. The following year, November 24, 1899, the Khalifa was killed in battle, and Lord Kitchener sent to London the terse message, "The Soudan may now be declared open."

TRYING TO FIND THE POLES.

ARCTIC AND ANTARCTIC EXPLORATION.

OF all the baffling forces of nature possibly those experienced in polar expeditions are the greatest. For nearly three hundred years brave explorers have battled with icebergs and frozen seas, and all in the quest of those unknown ands about the poles. Of the many expeditions, successful and otherwise, those of Greely, Peary, Nansen, and Andrée are possibly the most important. Amerca has given to the world much information on the Arctic Ocean, and Lieutenant Peary, of the United States navy, who is now in Greenland, has done as much for our glory in discoveries as any other. He made trips in 1886, 1891, 1894 and 1898, triving in the main to reach the North Pole by traveling across the land ice of Greenland. During the last trip, however, from which he has not yet returned, he intended to try a system of food posts, one after the other, farther and farther towards the pole. Andrée, who probably perished with his two brave companions, sought to reach the pole by balloon, figuring that the wind currents would carry him safely. His start was bad, however, and the last heard from him was a message taken from a carrier pigeon shot near Wadden Island, and which stated that July 13, 1898, the party was in good health. Nansen, a Norwegian, sailing under government instructions in the "Fram," used the method of drifting with currents toward the pole, and reached the farthest known point north, 86 degrees and 14 minutes, or within less than four degrees of the object of all explorers' search.

The Antarctic Ocean

has not been as well explored as has its northern mate, but its region is full of interest. Three distinct points of land jut out of this great frozen sea toward the north, which are known as Wilkes Land, Enderby Land and Graham Land. These three lands form almost a triangle, with points on each side of the earth. About all that is known of them is the intense condition of cold that exists on the interior, as is found by the great currents of cold air that blow off the land However, it is supposed that a great continent exists there, yet to be explored The latest southern exploration was tha of the "Belgic," sent out by the Belgia government. The party on this vesse was ice-bound below the seventieth parallel for eleven months, the farthest point being 71½ degrees. One important discovery made by them was that the southern magnetic pole, which governs the compass in the southern hemisphere, is some two hundred miles farther east than was formerly supposed.

ALMOST AT THE NORTH POLE.

The American flag flying from one of the series of relief and supply stations at Cape Tegetthoff.

THE PARTITION OF CHINA.

NATIONS SCRAMBLE FOR POSSESSION OF THE FLOWERY KINGDOM.

WHEN the war between China and Japan was ended and China was beaten so badly that she had to give not only cash indemnity but territory as well to her victorious opponent, the nations of Europe saw that there lay before them a country the most populous in the world, rich in its resources, and lacking force of character so much that they at once decided to grab as much of this easy prize as they could. Japan was deeded as indemnity Shashili, Suchow, Hang-Chow, the Liau-Tong peninsula, and the temporary possession of the port of Wei-Hai-Wei. Russia, France and Germany at once complained of this; Russia wishing Port Arthur, in the province of Liau-Tong, as a southern terminus of the Siberian railway. Russia got possession of Port Arthur with long leases.

Germany complained of this treatment, and a little later, rather opportunely, occurred the massacre of several German missionaries. This was used as a good pretext for demands upon China, and a seizure of ports was made by forces landed from German warships. After a dispute between the two governments, China paid a sum of $450,000 to the families of the murdered men, and gave a ninety-nine-year lease of the port of Kiao Chau and other territory seized by Germany to that nation. About this time Great Britain was fully awake to the possibilities of the situation, and began dickering for her share of the spoils. China had to have money to pay the war claims of Japan, and the only place to get it was London. Eighty million dollars were advanced to China by England, and as security the port of Wei-Hai-Wei was given over. England now controlled the gulf of Pe-chi-li and the great valley of the Yang-tse-Kiang River, with its tributaries, draining 800,000 square miles. Later France strengthened herself along the Tonquin frontier on the south; she also acquired a lease on the south coast, with large rights for railway construction. To offset this, England secured parts of Mirs Bay on the east, and Deep Bay on the west, as well as the island of Lantao.

The partition of China is yet only just begun, and with such weak forces, no general in command of her armies, and vacillating methods of government, her unique history is threatened with severe trials unless her vast hordes rise with knowledge of their power, and throw off the encroaching Europeans.

The population of China is nearly one-third of the population of the world. The population of China and India together is nearly twice that of all of the rest of the world.

The area of China is 4,218,400 square miles.

There are over three thousand letters or characters in the Chinese alphabet.

Pekin consumes 450,000 tons of rice annually.

American Expansion.

HOW THE UNITED STATES IS DOMINATING MODERN CIVILIZATION.

WHILE the United States government has not interfered in these partitions, her "sphere of influence" is not altogether wanting. Upon the signing of the Treaty of Paris, which closed the Spanish-American war, and which gave to American control the resourceful Philippine Islands and one island in the Ladrones, in the Pacific, besides the other American acquisitions, Europe at large felt that the United States were overstepping the famous Monroe Doctrine. Early in 1898 the annexation of the Hawaiian Islands had been accomplished by the United States, mainly as a war measure for protection in the Pacific Ocean. As it is now, the sun hardly sets on the American flag. Besides this great influence brought to bear on the far east through colonization and commerce with our dependencies and with pushing the war in the Philippines, we have made ourselves materially felt in Asia proper by exporting great quantities of supplies for the Trans-Siberian and Chinese Eastern railways. In Africa, as yet, we hold little other than protection over native-born American adventurers in the Boers' republics, but here also American push and energy have been felt. When Lord Kitchener was pushing into the Soudan with his new military ra- way, he found it necessary to

Bridge the Atbara River.

American engineers, with their usu foresight, jumped to the spot, and promising quicker work than any co- petitor landed the prize. Thirty da from the time of the letting of the co tract, the steel girders for the constructi of the bridge were leaving the harbor f New York on their way to Africa.

But if we are pushing forward in w and in commerce, the result has not bee without evil comment by many perso and nations. China, with her dread the influence of the white man, has e pressed, through Li Hung Chang, h dislike for the methods of the republ which brought forth the great Grant wh was so popular with the Chinese. "Ha he yet been alive," remarks Earl L "there would never have been this greed expansion toward the weaker people lands."

The South American republics, wit whom we have always been on suc friendly terms, look with fear upon wha they think are mere aggressions. The now talk of binding themselves togethe for protection against any encroachment further south, for with control of Cuba, which they think we will never give up, and the absolute annexation of Puerto Rico, they believe that it will not be long before the Yankees will strive still further to dominate the continent.

OUR WAR WITH SPAIN.

After the bloodshed of years on the island of Cuba, the destruction of the U. S. S. Maine by an explosion in the Havana harbor wrought the people of the United States to such fever heat that nothing could come but war with Spain. A court of inquiry was appointed by the President, and the finding was that the explosion had been caused by a submarine mine. This resulted in still greater ill-feeling between the two countries. April 21, 1898, Minister Woodford received his passports from Spain, and the next day the first prize of the war was captured, the Buena Ventura, by the United States gunboat Nashville. On the twenty-third, the President called for 125,000 volunteers, and the next day Spain issued a decree stating that a state of war existed with the United States. May 1, the celebrated battle of Manila occurred, in which Commodore, now Admiral, Dewey annihilated the Spanish Asiatic fleet, and took possession of the Philippine Islands. Campaigns were at once started in Cuba and Puerto Rico, while the Atlantic squadrons, increased by new vessels recently purchased from other countries and by ocean greyhounds pressed into the service by the government, blockaded the Cuban ports and tried to lay a net for the fleet of Cervera, which was on its way to protect the islands. July 1, the celebrated charges up the heights of El Caney and San Juan were successfully made by the American forces. The next day the Spanish attempted to re-take the heights, but were unsuccessful. American losses were: killed, officers, 23, men, 208; wounded, officers, 80, men, 1,203; missing, 81 men. July 3, Cervera's fleet attempted to run the blockade of the harbor of Santiago and was thoroughly overwhelmed, with a terrible loss of life and the capture of 1,300 prisoners, while on the American side only one man was killed. July 14, General Toral, commander of the military of Santiago Province, surrendered. July 26, M. Jules Cambon, the French Ambassador at Washington, in whose hands had been placed the affairs of Spain during the conflict, commenced negotiations for peace with the President. August 11, a protocol suspending hostilities was signed by W. R. Day, Secretary of State, and Jules Cambon, and the President issued a proclamation of temporary peace. August 13, General Merritt and Admiral Dewey, by combined attack, carried Manila by storm, and after five hours, fighting the Spanish surrendered the city, with about 7,000 prisoners. October 1, the commissioners for peace of the two governments met at Paris. December 10, the treaty of peace was signed by the representatives of the two governments. From the opening of the war till the date of signing the treaty but 233 days elapsed.

The casualties during this war were:

	Killed		Wounded	
	Officers.	Privates.	Officers.	Privates.
Cuba	23	237	99	1,332
Puerto Rico	...	3	4	36
Manila	...	17	10	96
Died of wounds	4	61	—	—
	27	318	113	1,464

The number of deaths by disease and accident from May 1 to September 30 was 2,565. Total of deaths during war from all causes, 2,910.

RICHES GREATER THAN KING SOLOMON'S.

KLONDIKE AND CAPE NOME GOLD DISTRICTS.
DIAMONDS OF ENORMOUS VALUE.

Klondike.

THE fall of 1897 brought great quantities of gold from Alaska and the bordering Canadian frontier, with news of still greater veins to be opened up. At once great numbers of prospectors struck out for that country, expecting a duplicate of the "days of '49." They were not disappointed, for there were found the richest of deposits all along the Yukon and Klondike rivers. However, the hardships to be endured were so great that they have turned back many prospective miners.

For many years it had been known that Alaska was rich in gold, but that such great amounts would be taken out was never dreamed. The territory that is so rich in this product lies mostly just within the Canadian lines and between our border and the 138th meridian of west longitude, and has for central point Dawson City. Circle City, with a surrounding gold-bearing region, lies further west and within the United States territory, not far from Fort Yukon, on the river of the same name. The Klondike is really only a creek tributary to the Yukon, while Lewis River, Forty Mile Creek, and Copper River are adjacent to it and bear gold. The Klondike, which names the district, was called Throchec by the Indians, which means salmon, possib because of the great number of these fis there.

The Town of Dawson,

which was named after the man who fixe the boundary between American an Canadian possessions, is new, and is chiefl a source of supplies and a place of mee ing. The site is on the east bank of th Yukon and on the north bank of th Klondike River, which empties into th Yukon at that point. The boundary lin is seventy miles southwest.

The gold has been found in the sma creeks that flow into the Klondike. Firs comes Bonanza Creek, a mile and a hal back of Dawson. It is thirty miles lon and very rich, but its tributaries are stil better. Ten miles up it the Eldorado, fo example, is the most productive strea that has been turned up; it is only si miles long, and is all staked out in claims about $250 has been taken out in pan, and it is estimated that the yiel will be $20,000,000. Seven miles abov Bonanza the Klondike receives the water of Bear Creek, which is also rich in gold Hunker Creek is fifteen miles up th Klondike, and up that is a little stream about the size of a brook, which is calle Gold Bottom. All these streams flow from the south, and they come from hills that must have lots of gold in them, fo her creeks that run out of them into dian River show yellow, too. Indian ver is about thirty miles south or up e Yukon from Dawson. Stewart River d Sixty Mile Creek, with their tributries, all south, and Forty Mile Creek, th its branches, off to the northwest— have gold. The average yearly yield the Alaskan and Klondike mines is out $6,000,000.

The Largest Nugget

er found in the Yukon country was ought to the surface creek claim 34 El-rado by Peter Gordt. weighs six pounds, d represents $1,158 rth of gold.

pe Nome District.

The most remarkable ld mining at present the world, if not the entire history of ld mining, is that w in progress at and out Cape Nome, on rton Sound, Behring a, Alaska, situated out 225 miles north l west of the mouth of Yukon River, or 135 les from St. Michael's. Gold was first covered on Snake River in the fall of 8. In June, or early in July, 1899, some of the stranded miners tenting on the ch, as the only unclaimed space, acci-tally discovered gold in the sand at his t. Never had such easy mining been rd of, never had it been found so unex-tedly and so opportunely, and it was long before everything else was de-ted for the seashore, and even women l boys of ten or twelve years were to found as busy in the sand as the men re. At present it is estimated that 1,000 to 1,200 miners are at work on the beach, extending west for twenty miles. All these work with rockers, and they occupy just as much territory to the man or group as can work it. It is not unusual for one small square bit of beach to pan out $10 to $15 per hour, but, of course, the space is soon exhausted and the lucky digger must move to another spot.

Where Does It Come From?

This beach deposit of gold is as yet an unsolved problem. By some it is claimed that the gold in the sand, which is entirely "dust," has been washed out from the tundra by the waves at high tide and deposited through hundreds of years in the sand.

HYDRAULIC MINING IN THE ALASKAN GOLD FIELDS.

Cripple Creek, Colorado.

Cripple Creek district is now at the height of its productive history. The rate of growth in output from month to month is greater than ever before, while the "gush veins," near the surface, have become strong ore bodies, with well defined walls, at from 300 to 800 feet in depth, with shafts extending to the 1,000-foot levels. The Portland Company has a gold production record of $7,000,000, with dividends to date amounting to $2,377,080. Its territory consists of over 180 acres of claims on Battle Mountain, and the whole property is splendidly and thoroughly equipped with up-to-date machinery and buildings. The output of $7,000,000 has been secured from 2½ per cent of the total acreage, leaving 97½ per cent practically untouched. The production of the mine is now being limited to $200,000 per month.

The gross value of the ore marketed from the camp in one month reached $1,731,000. Of the material shipped, the cyanide and chlorination mills treated 24,950 tons, ranging in value from $20 to $35 per ton, while the smelters handled 11,000 tons, at an estimated value of $93 per ton, a larger figure than ever before for this class of material, demonstrating a gain in gold contents as depth is attained in working the mines.

South Africa.

Gold was discovered in the Transvaal in 1886, and since that time has been taken out in vast quantities. Cities have arisen as if by magic. Railways, telegraph and cable lines have been strung, and everywhere has been felt the power of gold. In 1898, gold to the amount of $74,220,000 was taken from this region, and the limit to the veins is not yet near.

Diamonds.

Though diamonds are now found in the greatest abundance in Brazil and South America, they were formerly obtained from India, Borneo and the Ural Mountains of Russia. The great stones of history have almost without exception come from India, though recently a number of diamond monsters have been found in South Africa, of which the most note is the Excelsior, weighing 970 carats.

Occasionally diamonds come to light n other regions. The Piedmont plateau at the southeastern base of the Appalachia s, between Virginia and Georgia, has p o-duced some ten or twelve diamonds wh h have varied in weight from one to th e, carats, to the "Dewey" diamond, wh h weighed over twenty-three carats.

It is, however, in the territory of he great lakes that the greatest interest n w centers, for in this region a very inter t-ing problem of origin is being worked o t. No less than seven diamonds, rang g from four to twenty-four carats, h v been found in the clays and gravels o this region.

In 1883, a diamond was brought to M l waukee and sold for $1. Later it as found to be a diamond of sixteen car s weight. The woman who found it li d in Eagle, Wis., and the stone was pic d up during the excavation of a well. T n years later a four-carat diamond as found at Oregon, Wis., by a farmer's o at play in a clay bank. A third diam n was found at Kohlsville. Another bea i ful stone of six carats was found at Sa ville, Wis., and was in the possessio the finder sixteen years before he knew t value.

Probably the

Greatest Diamond Mines

of the world to-day are those in around Kimberley, in South Afr Diamonds were discovered here in 18 and since then the value of the wor output has been fixed at this point. W may the value of these mines be imagi when we learn that since their first covery diamonds to the value of $4 000,000 have been marketed from So Africa.

COMBINATIONS OF WEALTH.

The Greatest Problem of the Age.

WHAT ARE WE TO DO WITH CORPORATIONS AND TRUSTS?

THE beginning of the industrial combinations goes back a great many years. It dates from the abandonment of the spinning wheel and the knitting needle. When women went out of the stocking-knitting and rag-carpet business, that industry was taken up by men who had machinery with which to carry it on more cheaply and more quickly. When the cotton-gin was invented the industrial combination had its beginning. When the machinery that makes boots and shoes was invented the great boot and shoe factories were made possible, and the business of the individual shoemaker was taken from his hands and put into the hands of the capitalists. When the oyster men on the Long Island shore began to turn their oysters over to the owner of a big sloop, who took them to market, they economized time and made what was in principle a business combination like what are known as the trusts. The dairy farmer sends his milk to a co-operative cheese factory, where the work which was once done on his own place is done much more cheaply and much better; and he gets a better price for his product at a smaller expenditure of labor.

These combinations are being formed everywhere. Cartwright's power loom gives employment to half a million people in the United States, and their wages are $160,000,000 a year. Whitney's cotton-gin enables us to put on the market every year two hundred and fifty million dollars' worth of cotton goods at a price which makes clothing plentiful and cheap, but still gives employment to hundreds of thousands of men at good wages and brings to capital a fair return.

The Old Hand Process

of shelling corn was so slow that it would take one-third of the whole population of the United States working every day in the year to shell the corn crop of this country, if machinery had not been invented that does the work with marvelous rapidity and cheapness. The possibilities of economy in production are enormous. Invention is the foundation of industrial combination. These combinations have not only increased enormously the productive capacity of the people, but increased the wages of labor and the certainty and steadiness of employment, and cheapened the product of labor to the consumer. It is because of these combinations that we are to-day sending enormous quantities of manufactured goods to all the countries of the world It is not alone capital which has entered into combinations. Labor has its combinations, and they will increase in strength.

The danger which confronts industrial combination is the danger of over-capitalization. We have had some evidences of a disposition to over-capitalize already, and too much stress can not be laid on working against it. It should be regulated by law. This danger was more serious once than it now appears. We were threatened not long ago with a repetition of the South Sea bubble. The story of

The Trusts

has created an epidemic of desire to acquire sudden wealth. At intervals the public hears of men who have risen from comparative poverty to great riches in a short period of time, and others wish to do likewise.

Aside from the question of over-capitalization, the trust is in a large measure on trial. It was not so many years ago that there was a bitter public sentiment against corporations. Every effort was made, especially by adverse legislation, to discourage them. After a time men began to realize the benefits of the corporate form, and now recognize its advantages. The same feeling exists to-day toward great industrial combinations. It found expression recently in Missouri, in the passage of a law against the department store. In one respect

The Department Store

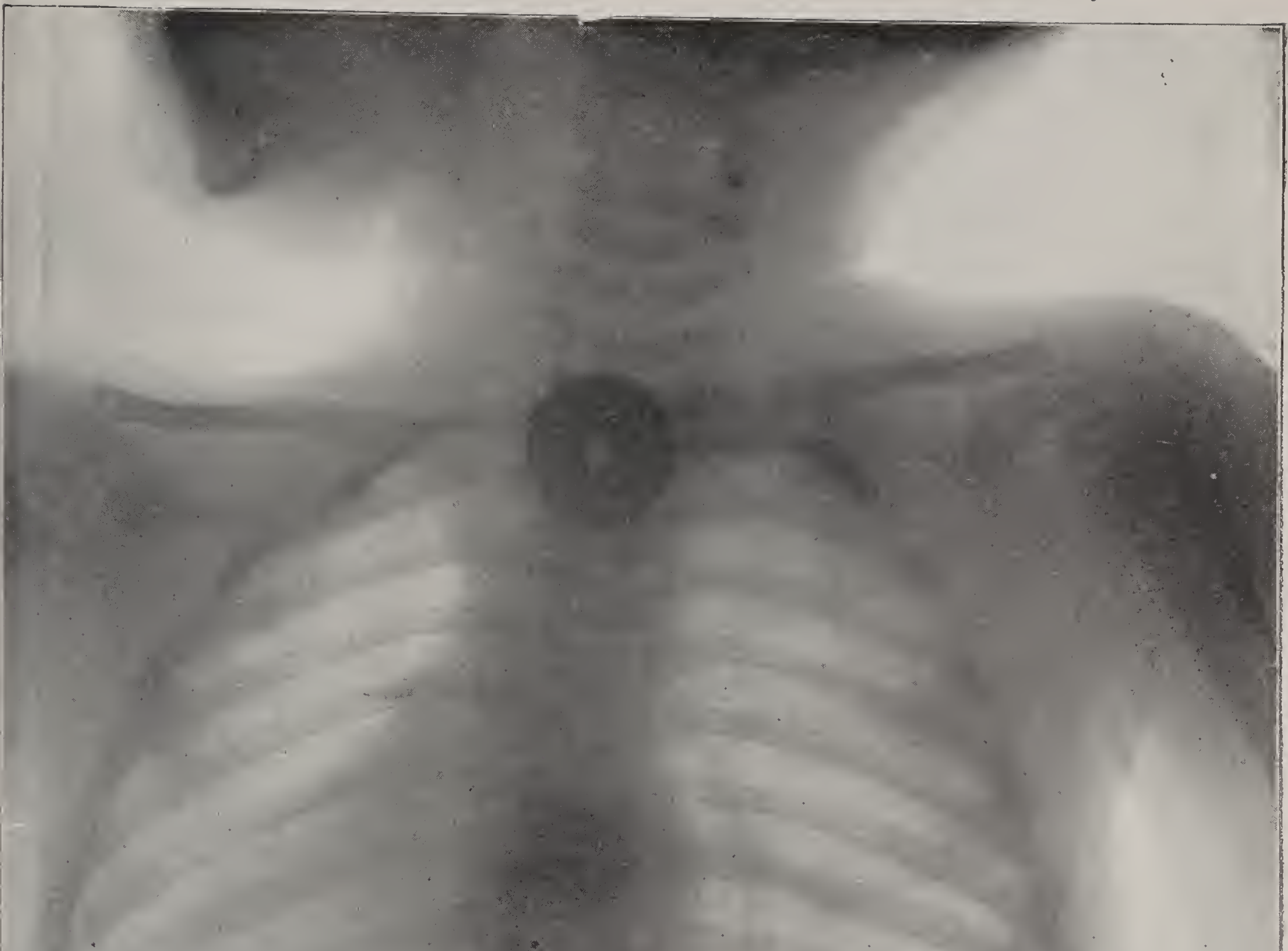
is like what we know as the trust. The man with small capital—say ten thousand dollars—is doing a business of one hundred thousand a year, and has to make at least five per cent on the gross sum to pay the expenses of his establishment and support himself. Along comes a department store and goes into competition with him. That store does a business of a million dollars a year, and can figure on a fair profit if it makes only one per cent on its gross receipts. The one-per-cent store drives all the little people out of business, and they must either move to some smaller place or quit business.

The feeling of twenty years ago agains the Vanderbilts is being duplicated to-day as a result of industrial combinations. I is a hatred of the very wealthy, and a desire to deprive them of the greater par of their wealth. Whether it will find expression in stringent legislation agains the trusts, no one can tell now. The American people, when they have had time to consider a matter carefully, are pretty sure to form a correct judgment about it. They sometimes act hastily and do wrong; but they are sure to come out right in the end.

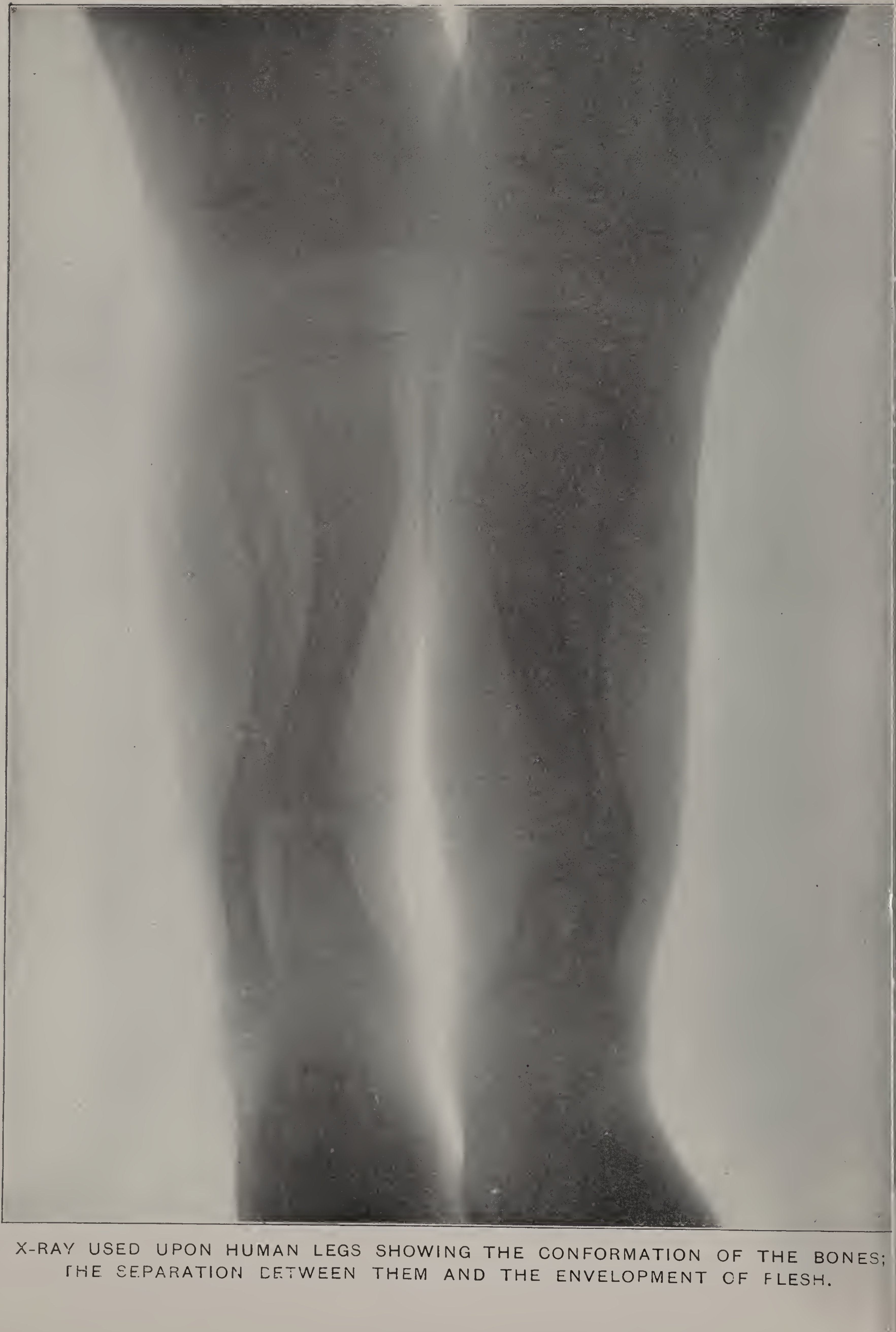
The Trust is on Trial.

If it proves, like the corporation, to be inoppressive, and a necessity to the conduct of certain operations which are for the public good, it will live. If, on the other hand, it oppresses the people, they will very quickly put a stop to it. If it violates public sentiment, it cannot live—if it puts into the hands of a few men the manufacture or distribution of any article of prime necessity, so that the American people feel that they are dependent on any set of men for coal or steel or anything which is in universal use, it will die.

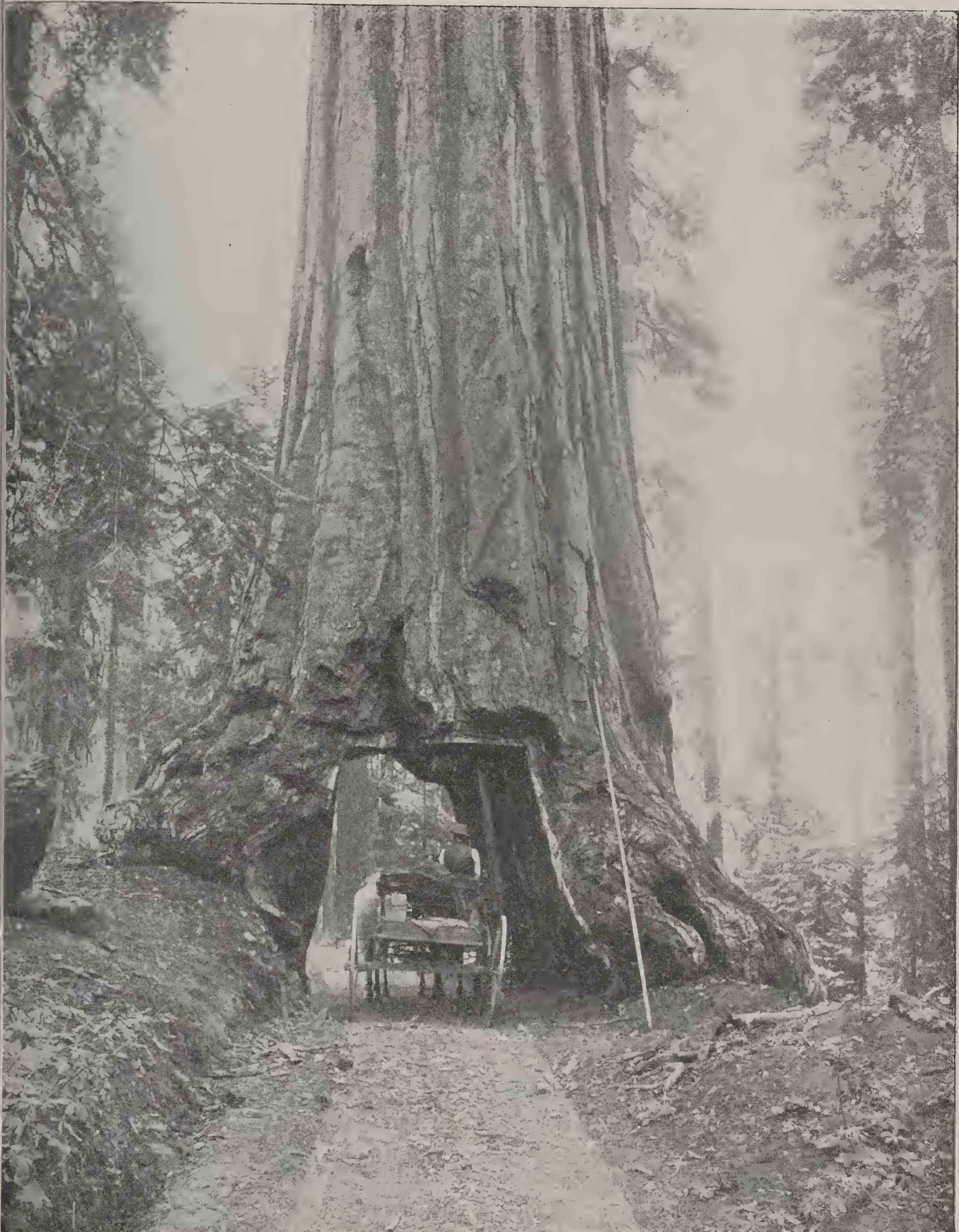
The Carnegie Steel Company, with its capital of $250,000,000, and the Federal Steel Company, and the American Company, are of enormous wealth and power, and each controls a large part of the trade. But they operate independently of each other, and it is possible for the other steel and iron plants also to live; hence there is little popular feeling against them. If they combined to form one gigantic corporation, and to crowd out some of the smaller though still important makers of iron and steel, they will find public opinion operating to bring about legislation to restrain them, and



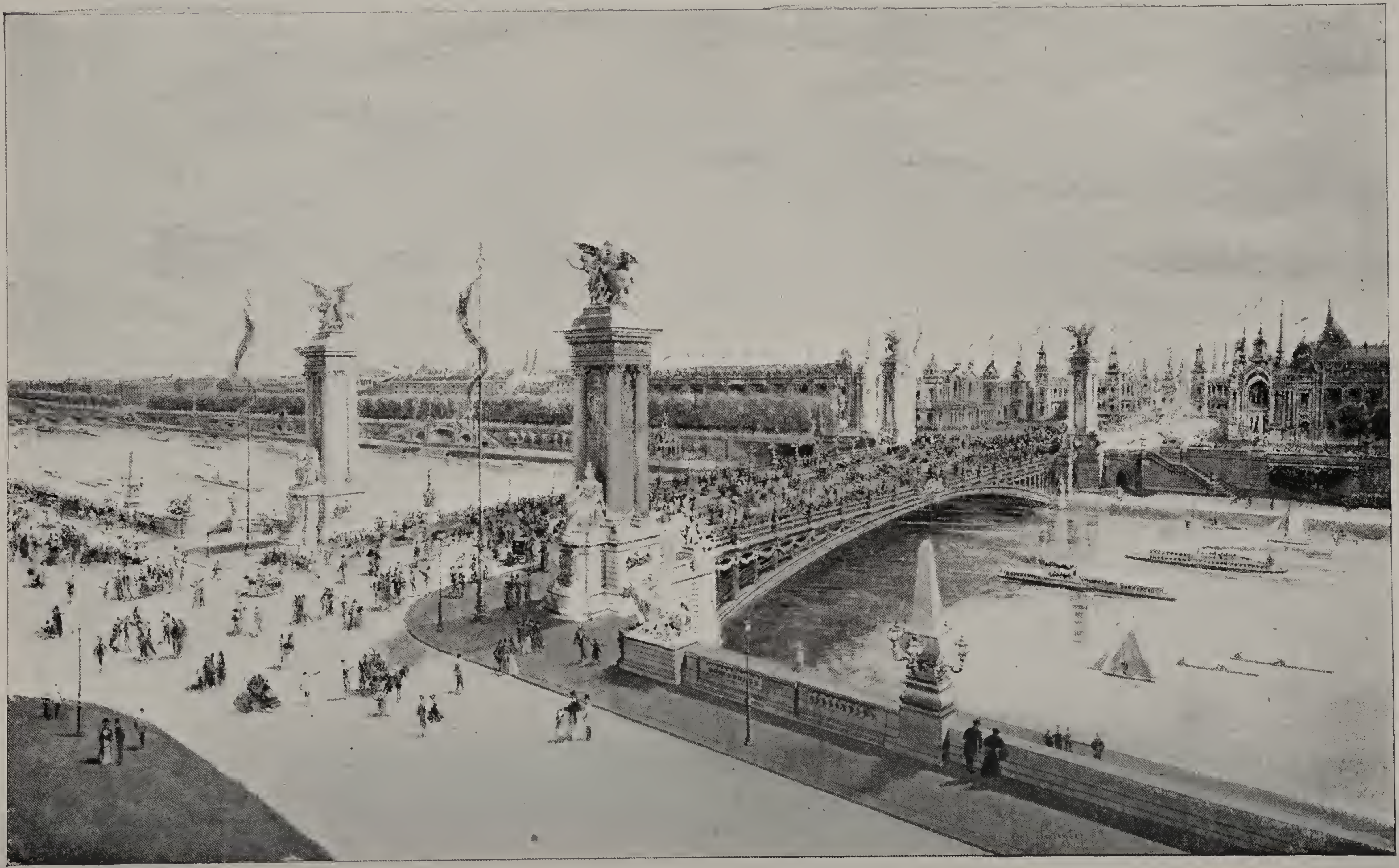
THE ROENTGEN OR X-RAY SHOWING A BUTTON LODGED AT THE ENTRANCE TO THE LUNGS. SEE HOW PLAINLY THE RIBS SHOW.



X-RAY USED UPON HUMAN LEGS SHOWING THE CONFORMATION OF THE BONES; THE SEPARATION BETWEEN THEM AND THE ENVELOPMENT OF FLESH.



BIG TREE "WAWONA," MARIPOSA GROVE, CALIFORNIA
28 FEET IN DIAMETER AND 275 FEET HIGH



BRIDGE ALEXANDER III, PARIS, AND EXPOSITION BUILDINGS, 1900 eventually to break up their business, if it did not break up through the natural operation of the laws of trade.

The Whisky Trust Met Its Fate

without the intervention of the law-making power. It undertook to do so much for its stockholders that it actually made it profitable for the man of small capital to start in business; for if he could not compete with the trust he could at least sell out to it; and in time the building of distilleries to sell to the trust became a recognized industry.

It remains to be determined whether the regulation of the trusts is a matter for Congress, or, as the Attorney General holds, for the States which charter them.

South Africa and the Boers.

England's Conquest of the Transvaal.

THE clash of arms in South Africa between the forces of Great Britain and those of the two Dutch republics, the Transvaal, otherwise known as the South African Republic, and the Orange Free State, is the final outcome of a state of ill-feeling that dates back to the beginning of the century. South Africa was originally settled by the Dutch. Huguenot refugees from France followed and intermarried with the Dutch. The Boers, or Dutch Afrikanders, of to-day are, therefore, a mixed race, a fact that is shown by the names of their leaders, that of President Kruger, for example, being Dutch, and General Joubert's being French. The colonists were always restive under the control of a European government, and in 1795 threw off the allegiance to Holland.

The British Gained Control

the same year, and with the exception of the brief period from 1802 to 1806 have been supreme in Cape Colony ever since Holland renounced all claims to the Cape settlement in 1814, in consideration of the payment of $30,000,000 by England.

From the first the Boers chafed under the British rule, and when the measures abolishing slavery throughout the empire were adopted, and the Boers were compelled in 1834 to free the native Africans whom they held in slavery, their dislike for the British was intensified into bitter hatred.

The Life of the Boers

at this time was very primitive. With their herds and their slaves they wandered from one pasture land to another, like the patriarchs of the Israelites, to whom they loved to compare themselves. The British government appropriated $6,000,000 with which to indemnify the slave-holders for their losses, but payment was made in orders on London, which the Boers were compelled to discount at ruinous rates at the Cape. In 1835-36, immediately following the liberation of the slaves, occurred what is known as the "Great Trek," or migration. About 10,000 Boers "trekked" into the wilderness north of Orange River, where they hoped to be free from British control, and at liberty to treat the natives in accordance with their inclinations. Here they maintained themselves in independence at the cost of

Continual Warfare with the Natives,

until, in 1848, the British intervened to establish order, and took possession of the territory, naming it "Orange River Sovereignty." This action was taken at the solicitation of many of the inhabitants, who had grown weary of the struggles with the native tribes. The change was very distasteful, however, to a large party of the Boers, and these immediately revolted under the leadership of Pretorius. Having been defeated by the English under Sir Harry Smith, they "trekked" once more, this time into the country north of the Vaal River, where they established what became known as the

"Transvaal" Government.

After a few years, experience in control of the Orange River Sovereignty, the British reached the conclusion that it was not a desirable acquisition, and in 1852, by terms of the Sand River Convention, gave the Boers liberty to organize a government of their own. The Orange Free State was immediately established, and has maintained its independence ever since, unhampered by the English. The history of the years that follow is a record of constant warfare with the native tribes until, in 1875, threatened with extermination by an outbreak which they were unable to control, the Boers of Transvaal petitioned England to come to their assistance. England's control of the territory was the price asked, and April 12, 1877 Transvaal was annexed to Cape Colony. The danger past, the Boers repented their bargain and revolted in 1880, defeating the British in three engagements, in the last of which, the famous battle of Majuba Hill, Sir George Colley was killed. By a convention in 1881, signed at Pretoria, Mr. Gladstone's government restored independence to the Transvaal, now known as the South African Republic. It was clearly understood, however, that the Transvaal was to remain under the suzerainty of Great Britain. The Boers were not satisfied, and in 1884 negotiated a new agreement with Great Britain, known as the London Convention of 1884. By the terms of this agreement no restriction was placed on the independence of the South African Republic, except as expressed in the following statement: "The South African Republic will conclude no treaty or engagement with any state or nation other than the Orange Free State, nor with any native tribe to the eastward or westward of the Republic until the same has been approved by Her Majesty, the Queen."

The Discovery of Diamond Deposits

at Kimberley in 1870, and later on of gold in 1886, in the Transvaal, wrought great changes in the condition of the South African settlements. A mighty tide of immigration set in. Railroads and cities were built, and from a position of isolation South Africa became a theater of the greatest industrial activity on the part of enterprising men from all the civilized

ountries. The city of Johannesburg
prang up as by magic, and now has a
opulation of over 100,000. The Boers
lassed all new-comers as

"Uitlanders"

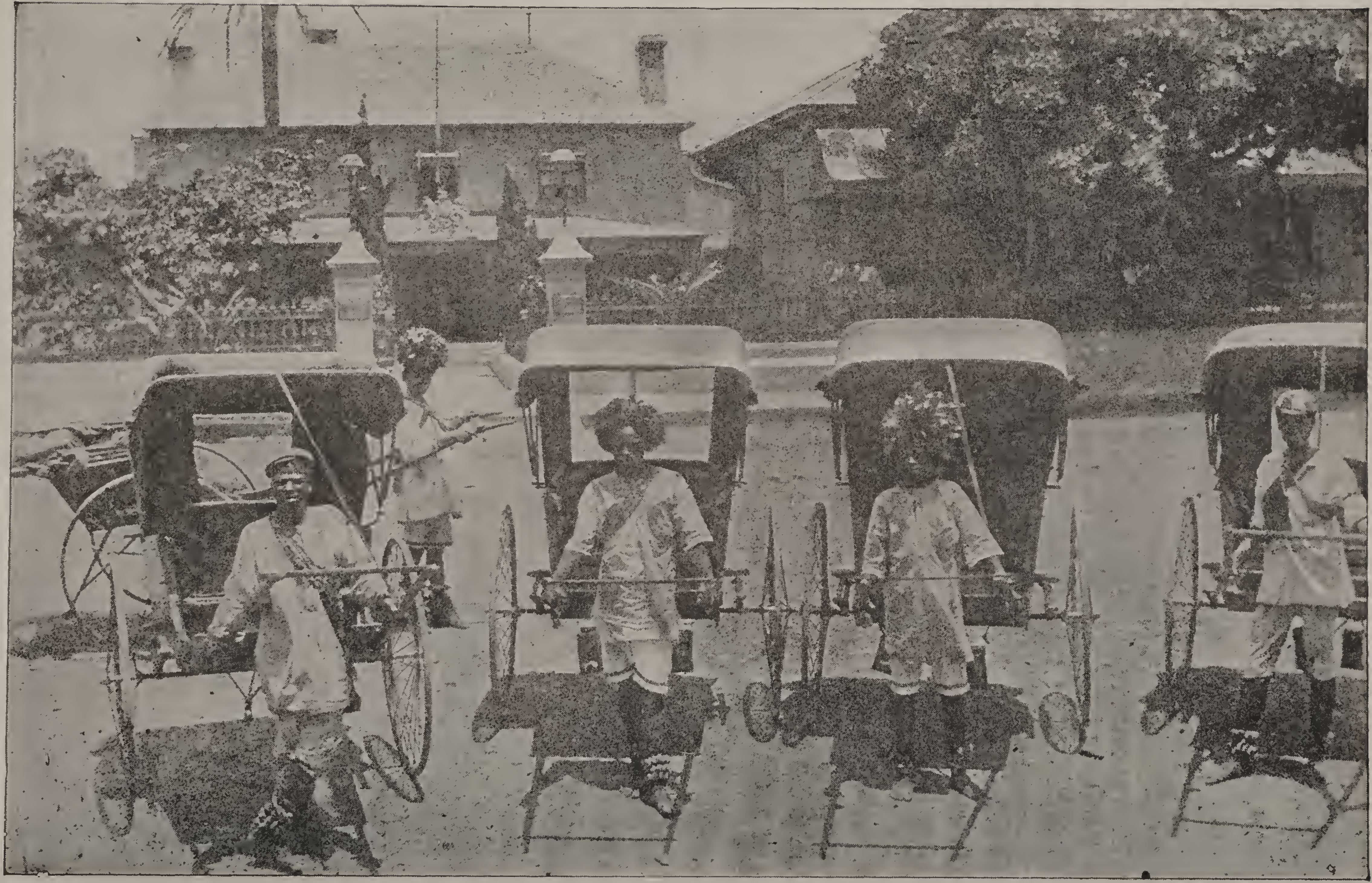
r foreigners, and viewed with alarm the
apid increase of their numbers. To-
ay the Uitlander population of the South
frican Republic is at least twice as large
s that of the Boers. In order to main-
ain themselves in control of the govern-
ent the Boers denied the Uitlanders the
rivilege of the ballot. They were taxed
eavily, and claimed to be subjected to
ther abuses, of which they complained to
e English. Their discontent reached a
risis in 1896, when a band of raiders
nder the leadership of Dr. Jameson
ntered the Transvaal with the purpose
f intervening by force of arms in behalf
f the Uitlanders. The attempt was a
ailure, and had the effect of intensifying
he bad feeling between the English and
he Boers. It was firmly believed by the
oers that the English government con-
ived at the effort to incite rebellion, but
is the British denied.

Since that time agitation has been
ept up more or less constantly by the
itlanders for the redress of their griev-
nces. In negotiations which preceded
he outbreak of the hostilities, the Boers
ontended that as the word "suzerainty"
as deliberately left out of the London
onvention of 1884,

British Suzerainty

o longer existed. This the British gov-
rnment refused to admit, and to empha-
ize its demands for reform began to concentrate troops on the border of the Transvaal. It became evident to the Boers that they would be compelled to yield or fight. They were unwilling to yield, and finally made a peremptory demand on Great Britain to withdraw her forces from the border of the Transvaal, stating that a failure to do so within forty-eight hours would be considered an act of war. The demand was refused, and the Boers immediately began hostilities in conjunction with the government of the Orange Free State, which served notice on Great Britain that it would support the South African Republic.

The division of the vast continent of Africa is really under way, and land-hungry England, always in the van of civilization and colonization, is in prospect of its own vast share. At present fourteen countries, with population aggregating 50,000,000 people, the greater majority of whom are blacks, cover a territory 2,600,000 square miles in extent, and are all under the shadow of the Union Jack. Diamonds and gold are the cause of the warfare that is ravaging the entire continent of Africa, and hardly can it be wondered at when in the last thirty years diamonds to the value of $400,000,000, and gold in 1898 to the amount of $74,213,953, were taken from South Africa alone. Foreigners with push and enterprise are populating and improving the country, and wish the Boers to do likewise. The Dutch, however, are a rather unprogressive lot, standing in the way of further encroachment this time with armed forces, which, it is likely, will eventually have to give way to the progress of Great Britain.



THE FAMOUS RICKSHA BOYS OF DURBAN, SOUTH AFRICA

THESE VEHICLES ARE USED PRINCIPALLY BY BUSINESS MEN IN GOING TO DIFFERENT PARTS OF THE CITY. ALL THE BOYS ARE ZULUS AND WEAR REEDS AROUND THEIR ANKLES CONTAINING SMALL STONES WHICH RATTLE WHILE THE BOYS ARE IN MOTION

How Glass Is Made.

Testing the Puddle—Extraordinary Heat Required—Workmen Must Have Great Endurance—Cooling the Mold—Making the Thermometer—Casting a Lens.

OF all forms of glass making that of casting and finishing the great lenses to be used in telescopes and microscopes is perhaps the most interesting and certainly is the most difficult and exacting of manufacture. The minerals from which glass is made were formerly mostly what scientists call silicates, such as potassium, lead, soda and lime, but now have been added to these ingredients phosphorus, magnesium, tin, iron, bismuth and numerous other elements. In making a huge lens the proper formula of ingredients is mixed and heated for weeks in huge yellow porcelain crucibles, specially prepared for the occasion, and which with one baking have served their purpose and are thrown into the scrap heap. Within the walls of a great furnace the terrific heat of days and days finally brings the molten mass to the proper consistency, and after it has been tested repeatedly through the "glory" hole,—about as big as a man's head—the large iron mold that is soon to receive it is brought up between the heating furnace and another furnace known as the "cooler," ready for the pouring.

CASTING A GREAT LENS IN A GLASS FACTORY, THE HOT METAL POURING INTO THE MOLD.

Testing the Puddle.

The master tests repeatedly the glass through the hole and sees by the "stirring paddle" that it is just right. Then he dusts the inside of the iron mold with a quantity of fine sand, that the glass may not absorb any impurities from the iron. On a signal a number of workmen begin to tear down the wall of the furnace and others bring forward a huge pair of tongs set on wheels, which will soon be attached to the glowing crucible within and drag it forth. When the wall is all down the tongs are shoved forward and fitted under a ring that encircles the middle of the crucible. At the other end of the tongs, averting their faces to avoid the intense heat, the workmen bear down to lift the crucible, lever-like, from the floor of the furnace, but it is stuck fast by the overflow of glass. Very carefully they bear down harder, and finally the fervid mass is wheeled out into the casting room. Here, lest it lose too much of its heat before the pouring, a mat of asbestos is thrown over it. Now the grappling irons are changed so that a pressure of a hilting bar will overturn the crucible. At the word from the master workman the men bear down and gently, without hiss or noise, the fiery mass flows out into the mold.

GLASSMAKERS BLOWING BOTTLES, CHIMNEYS AND OTHER GLASSWARE. A FURNACE SCENE.

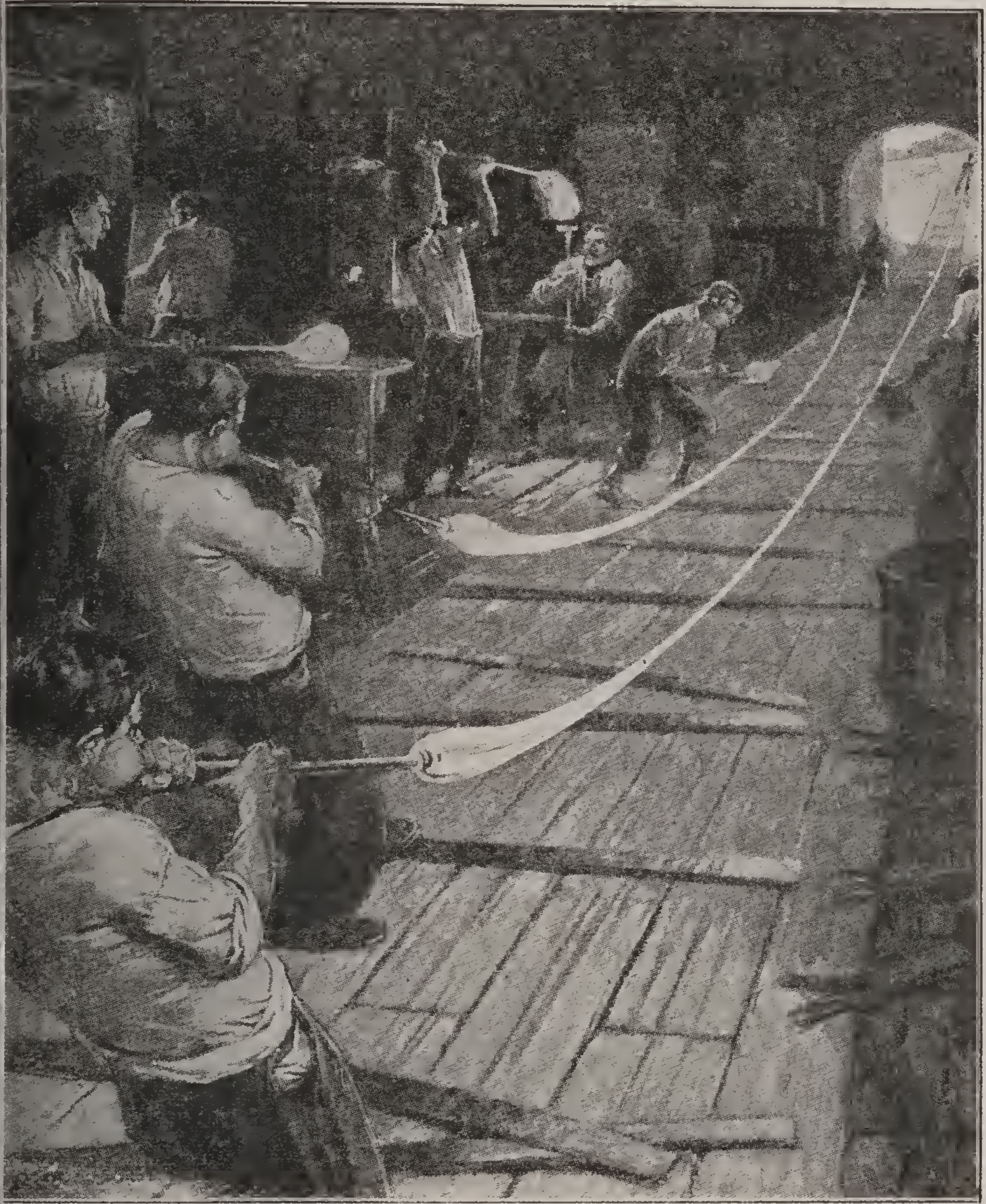
Cooling the Mold.

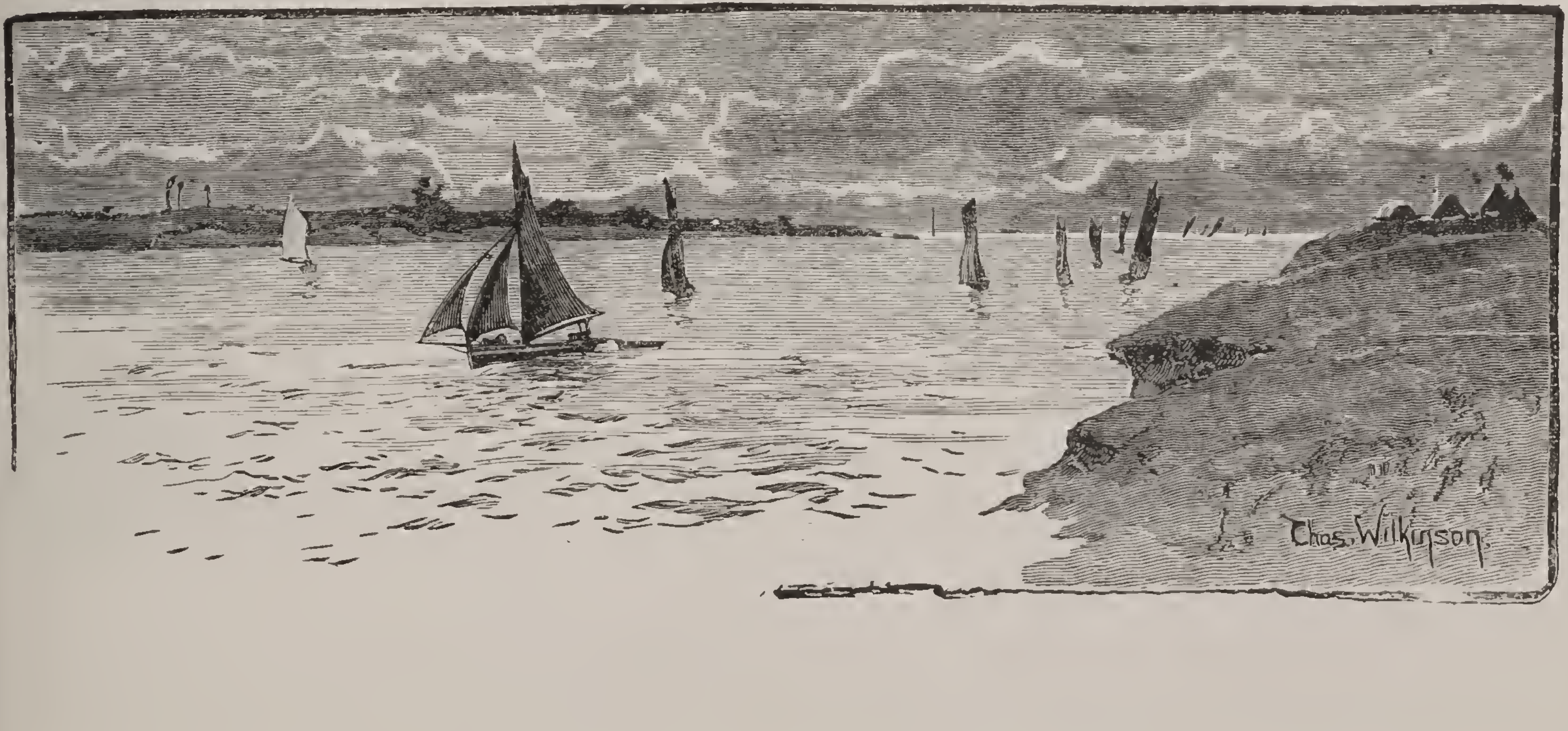
Now the mold is covered with an iron lid and taken by a crane and lifted to a little portable tramway upon which it runs into the cooling furnace. Here for several weeks the glass gradually gives up its heat and at last emerges after a week or two, a gray mass which resembles nothing like a lens, but rather a mass of sanded glass. This must now be polished for some time until it is clear,—not to be used yet for science, but simply for a test. If no flaws are found the lens is sent back to heat for several weeks and to perfectly anneal. After that it cools gradually for about two months, and then is ready for the lens polishers. The bare glass for such a lens is worth $5,000. The additional work of the lens polisher brings the price of a large lens to about $25,000.

There are hundreds of other kinds of glass manufactured, each with something of a different process. In making fine thermometer tubes a very interesting method is employed. Inside a long cor-

or are furnaces for heating the raw aterials into glass. When the right mixture is found a boy workman picks up a large blow pipe and jabbing it into the molten mass attaches a lump of it on the end of his pipe. This he blows and twirls until it assumes the shape of an acorn about the size of an orange. He now adds a little more glass, and then turns it over to a brawny workman who blows it and rolls it on an iron kneading board and then adds more glass.

Another workman quickly attaches the end of another pipe to the mass and both men start to run backwards away from each other down the corridor all the while blowing as if their cheeks would burst. In a few moments they have a thin tube as small as a little finger and some three hundred feet long lying on the floor of the corridor. This cools rapidly, and is then broken up into short lengths to go into barometers and thermometers and to be used for other scientific work.


BLOWING GLASS FOR THERMOMETER TUBES.


Chas. Wilkinson.

THE SAULT STE. MARIE.

A Great Canal of Commerce—Building of the Locks—Annual Traffic Enormous—United States Controls.

EARLY in the first quarter of the century the people of the State of Michigan began to realize what enormous interests were bound up in the problem of constructing a serviceable canal at Sault Ste. Marie, or Saint Mary's Falls, commonly known as the "Soo." As the connecting link between Lakes Superior and Huron this narrow ribbon of surging water practically controlled the lake traffi of the great northwest. Freight rates o the railroads had always been highe than by the water, and, since the cost o shipping is about three-quarters of a mil a ton for each mile traversed by wate compared to three mills per ton by rail, the vast saving to the great grain and ore producing west can readily be seen.

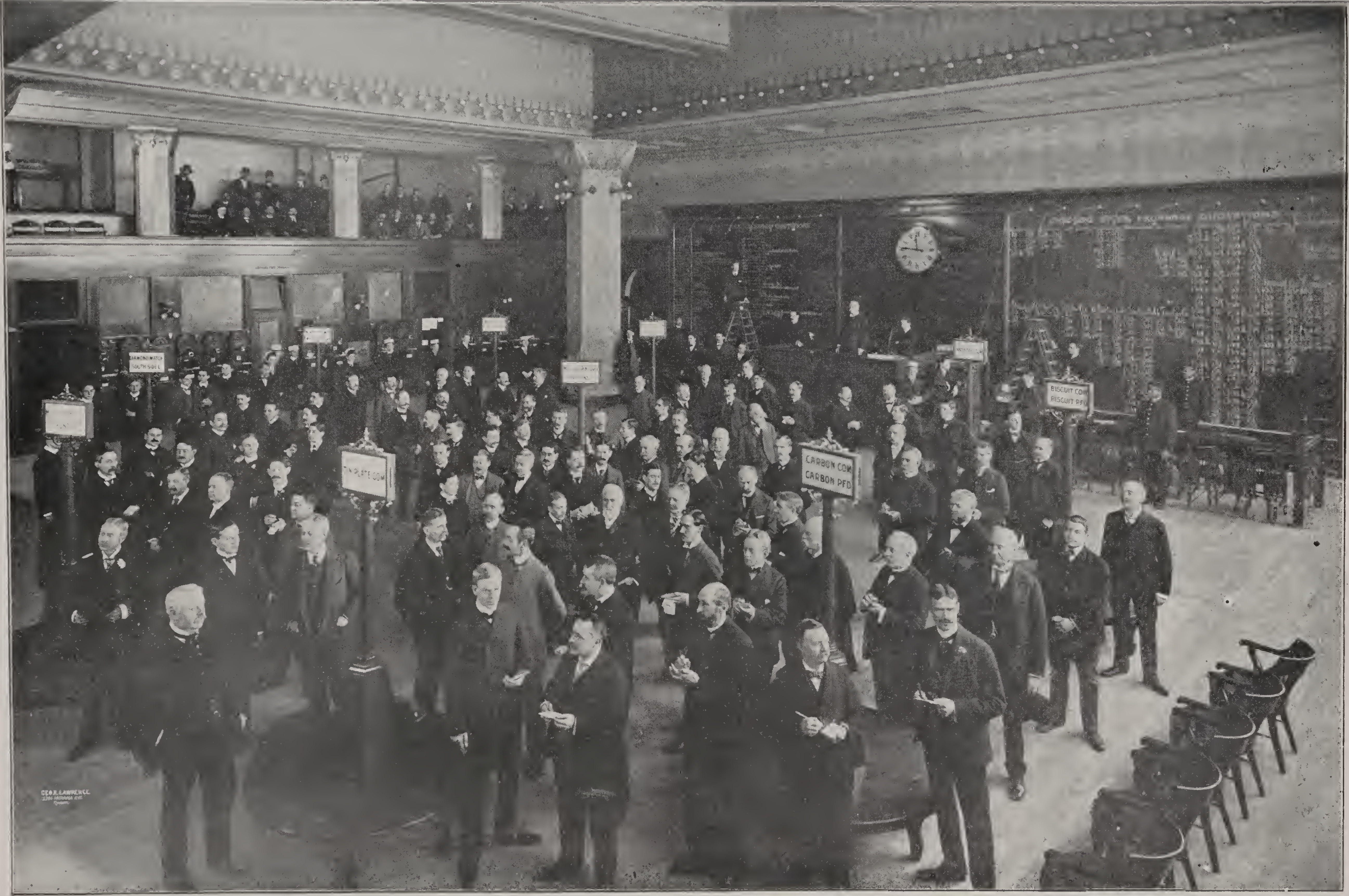
In the earliest history of the west th

THE CHANNEL OF THE "SOO" CANAL.

Thirty-eight feet deep, carrying 18,000,000 tons of commerce annually.

EMPEROR'S PALACE. BERLIN

FENCING EXERCISE IN GIRL'S GYMNASIUM

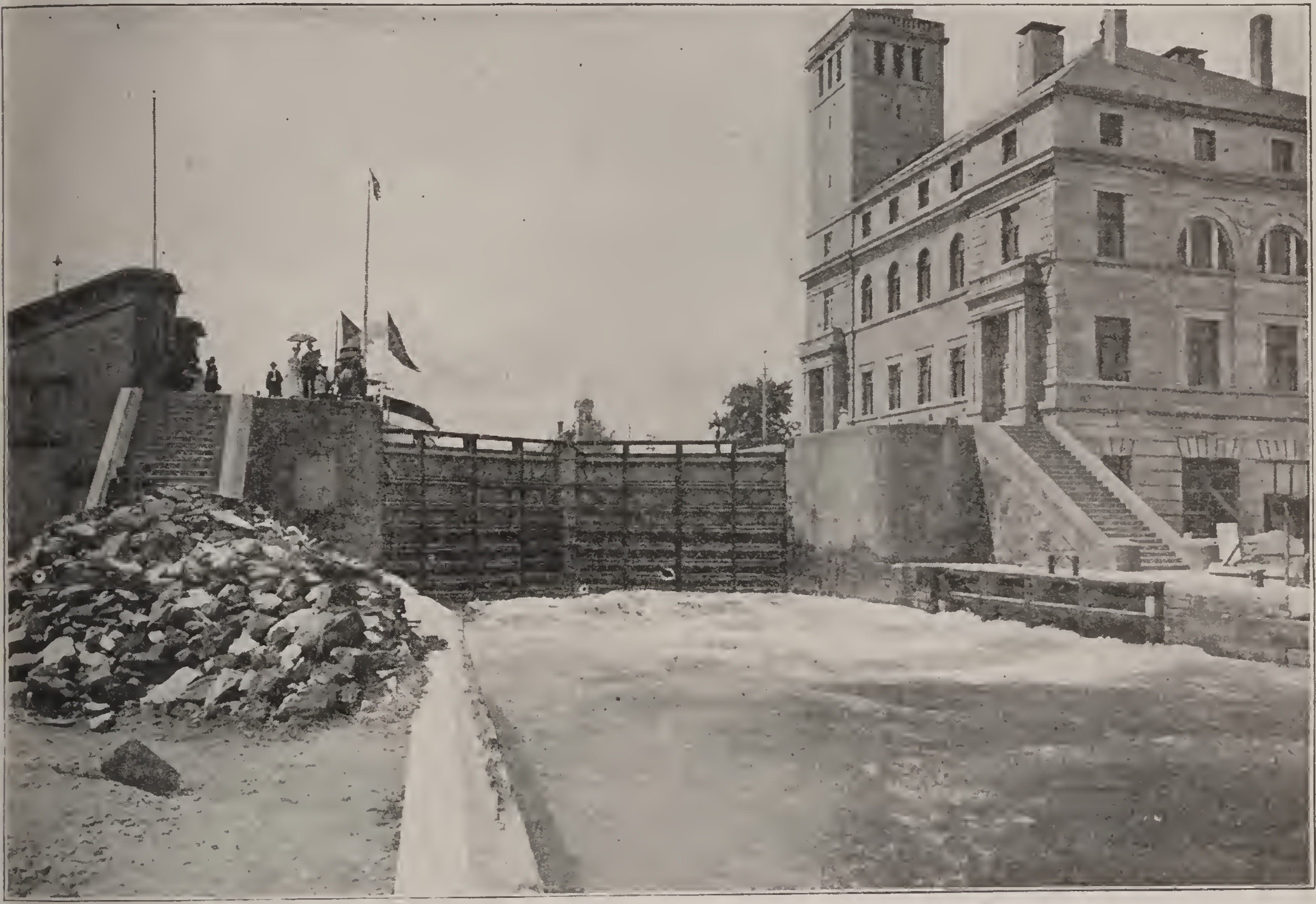


THE CHICAGO STOCK EXCHANGE WHERE THE STOCKS OF THE PRINCIPAL TRUSTS OF THE UNITED STATES ARE SOLD. SCENE DURING INTERMISSION.

settlers saw that an advantage was to be had by building a canal at this point, and accordingly they constructed a meager set of locks by which the fur-carrying canoes of the traders might be let down the nine-foot incline. After Michigan took up the matter Congress was petitioned and a grant of 750,000 acres of land was made for the purpose of establishing a suitable canal service. Work was begun on the canal, and so greatly had the lake traffic expanded that the locks when completed by the State were four times as large as at first contemplated. This system was seen to be inadequate, and the federal government was asked to assume charge of the future work, and did so in 1870.

National Control.

The control by the United States has resulted in the building of two magnificent locks, one of them the largest in the world,—and both operated absolutely free of cost to vessel interests. The smaller lock, which cost $2,500,000, is over 500 feet long and 85 feet wide. The larger measures a little over 800 feet in length, and is 100 feet wide. It cost over $5,000,000, but so effective is the construction that four mammoth lake steamers can lock through it together. Both locks let vessels down an incline of eighteen feet. Just opposite these two and on Canadian soil the Canadian government has built a lock similar to and almost as large as the larger of the American locks. The "Soo" is constructed of stone and concrete with mammoth metal gates. When the locks are to be used by vessels water is let in through numerous pipes which need scores of men to operate them.



LOCK HOUSE AND HEAD OF THE "SOO" CANAL.

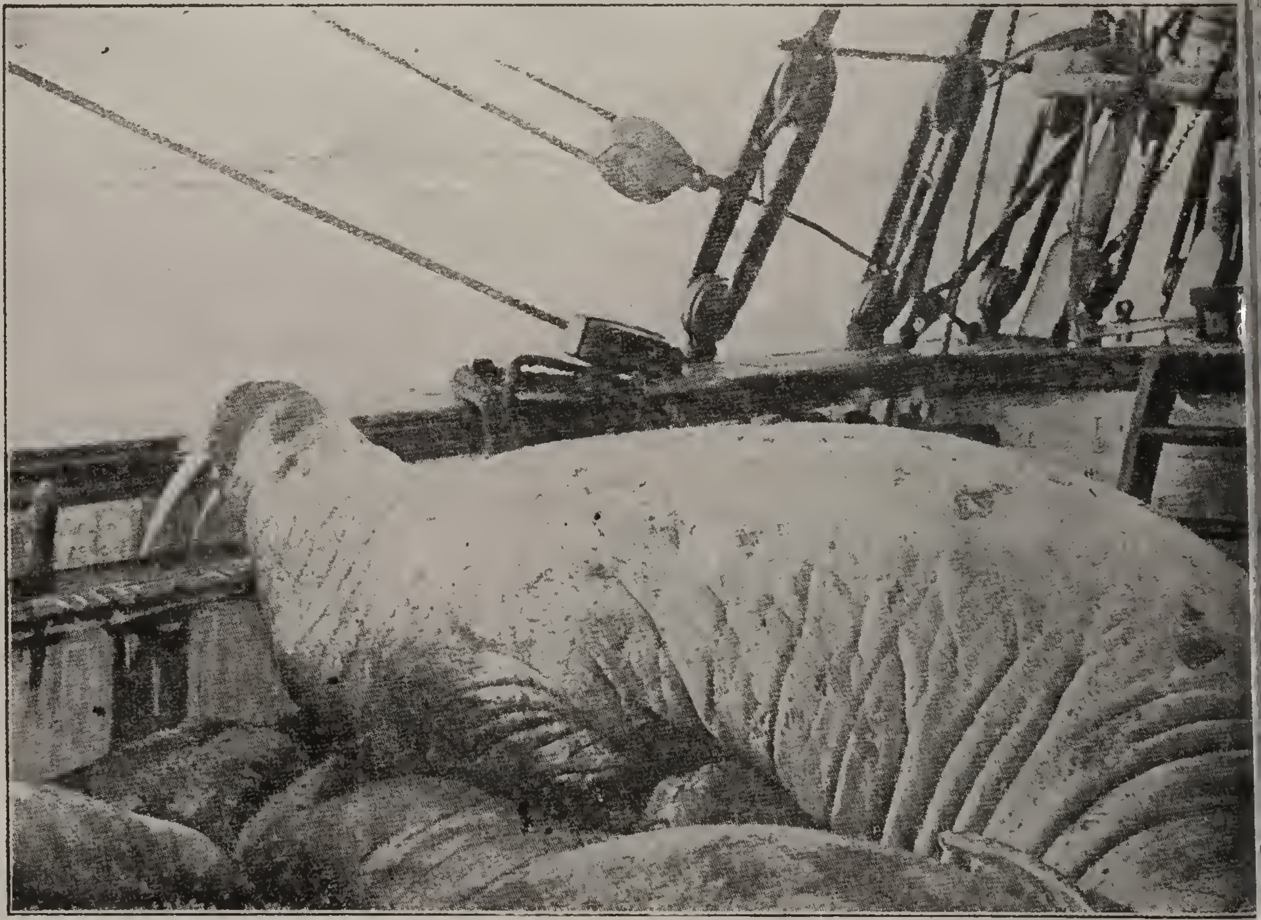
The magnitude of the traffic that annually goes through this waterway surpasses that of the Suez canal. Freight rates on America's inland seas are the cheapest of any in the world; besides the natural position of the "Soo" is that of the gateway for all the northwest. Coal to the value of $10,000,000 is annually carried through these locks, as is also flour wc $35,000,000, wheat worth $50,000,c $30,000,000 in copper, $35,000,000 wc of iron ore, and lumber to the value $12,000,000. The total value of produ carried through this waterway is estima at $240,000,000, while the cost of carri is only $8,000,000.

HUNTING THE WALRUS.

Great Danger to Life in the Sport—Use of the Harpoon—Winchester Rifles Employed—The Animal Tries to Escape.

A VERY profitable yet dangerous enterprise is carried on by Eskimos in the Arctic seas. It is walrus hunting. In hunting the walrus according to the Eskimo style, a whaleboat is used. Usually six or eight of these little men man a stout whaleboat which is let down from a larger craft in which they are making a cruise. The implements used in the capture of the walrus are a harpoon, several yards of stout rope, and a Winchester rifle.

The animal is sighted and the whaleboat lowered to make the attack. When the hunters come within from five to twenty yards of their prey the harpoon is thrown. If the shot is true the harpoon penetrates the skin of the animal and sinks several inches through t blubber and flesh. Once inside the wal the handle of the harpoon becomes lo and the barb or head sticks in the anim A line is attached to this barb so that t harpoon head takes a position horizon to the cut. Thus fastened, it is imp



THE MODERN WALRUS.
After capture and on shipboard. Weight, 1,800 pounds.

sible for the animal to get away unless the rope breaks.

The animal then tries to escape by swimming. The gun is brought into play at this stage of the game. It often takes six or seven shots before the animal is killed. His carcass is then drawn to the boat until a lance thrust can be made at the vital parts behind the flipper, near the heart and lungs. According to the Eskimos, a walrus shot on the ice will not be killed, as a single shot is insufficient. The dead animal is then towed to the vessel, where he is hoisted by means of pulleys to the deck and quickly disposed of.

BUILDING OF SHIPS.

England Leads all Countries—Steel Ships Are in Demand—Method of Construction—Ships for Use in War—Wonderful Progress in Designs.

ENGLAND leads the world in ship building and in the shipping industry. Previous to 1860, when metal ships began to gain the supremacy over wooden vessels, England possessed what might be called a monopoly in this branch of work, but soon after the inception of steel ships a change gradually took place. Germany, which had placed all her orders for ships in English yards, in 1865 commenced the establishment of a ship-building industry that in 1900 stands before that of any other continental country in Europe. Stettin is the German town containing the ship yards where the "Deutschland," the fastest of ocean greyhounds, was built. America, too, has made great strides in ship building since 1888, which year also marks the time when Germany struck out along lines of independent progress.

Between the years of 1860 and 1888 both Germany and America were placed at a disadvantage because neither of these countries could produce iron as cheaply as England. So rapid has been the development of the United States in the ability to mine and prepare iron and steel that experts of authority say this country will surpass Great Britain as a producer of ships before many years have gone by. England owns over 7,310,000 tons of steam merchant marine, which has an annual earning capacity of $500,000,000. The sailing fleet of our cousins across the water brings into the realm of Queen Victoria $130,000,000 every year. Perhaps a clearer understanding of England's position as a sea power can be obtained when it is stated that 56.6 of the world's merchant marine carrying capacity is done by the ships flying the Union Jack.

Some idea of the magnitude of the work necessary in the construction of a great ship can be grasped when it is understood that it is more than a year from the time that the keel of the "Deutschland" was made that the hull of the big liner was ready to be launched. A force of thirty draughtsmen worked on the drawings for this steamer before a stroke of the hammer was heard in the yards of Stettin.

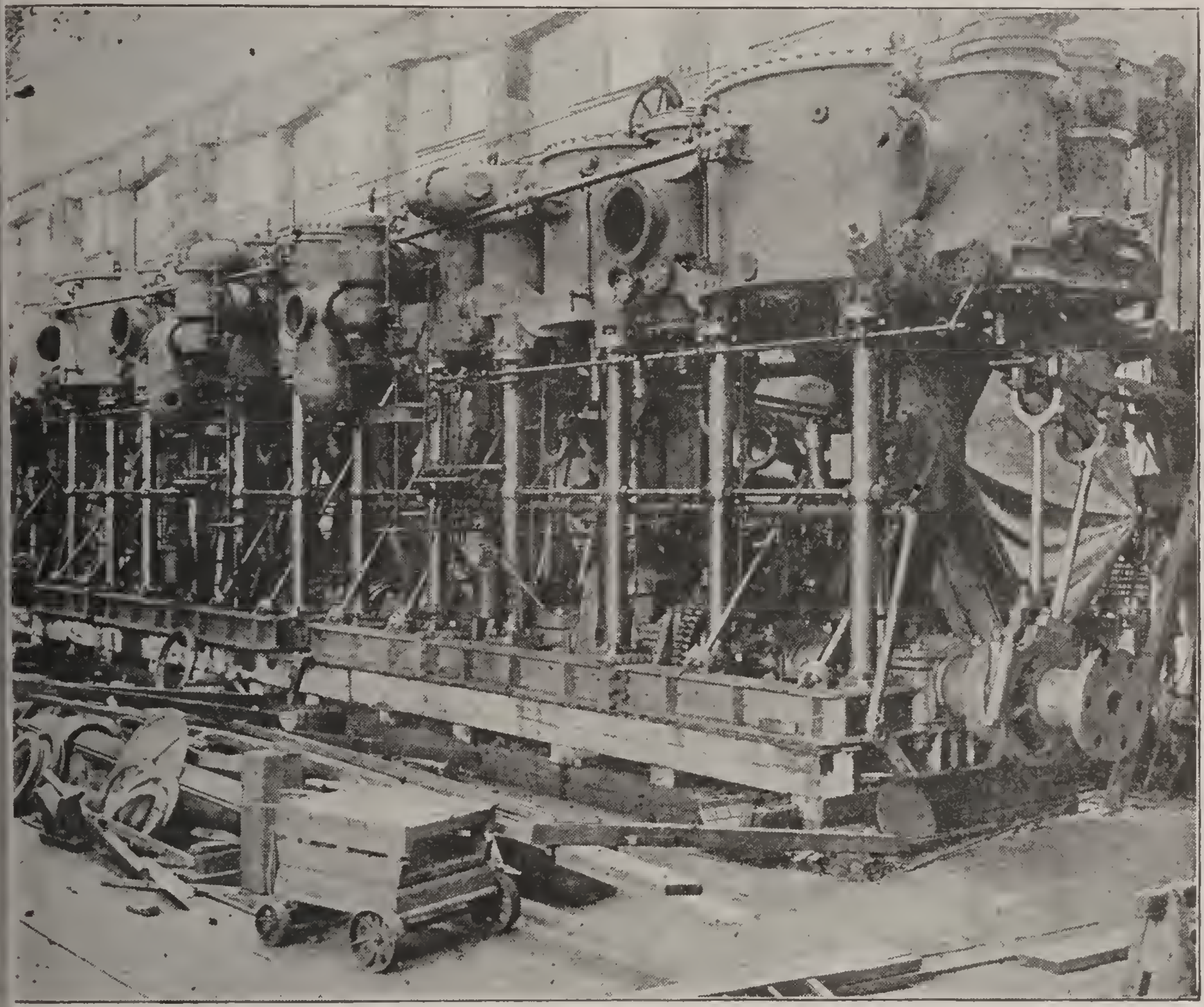
For one year after 1,500 skilled workmen put their entire time on the strips and sheets of steel which finally were united in the form of a ship. The total cost of the "Deutschland" was $3,000,000. Her speed is about twenty-six miles an hour, which is remarkably fast when it is remembered that this rate is frequently maintained for a day at a time. The length of the "Deutschland" is 686½ feet over all; the beam 67 feet, and the depth 44 feet. In displacement this ship registers 16,500 tons, nearly 6,000 tons more than that of either the "St. Paul" or the "St. Louis," the largest liners ever bui in the United States.

SCENE IN CRAMP'S SHIP-BUILDING YARDS AT PHILADELPHIA.

With two vessels about to be launched. Ships are launched when their keels and hulls are completed.

War Ships.

War ships differ in appearance fro ocean liners in that they usually hav more beam or breadth, and are, for th most part, not much over half as long This is because the liners are built primarily for speed. The two battleships "Alabama" and the "Kearsarge," th newest additions to the American navy were completed and launched in September, 1900. The money spent for the con truction of these fighting machines was omething over $11,000,000, which, as is een, amounts to nearly double the sum vhich would be required to build two hips of the class of the "Deutschland." Both the "Kearsarge" and the "Ala-ama" are 368 feet long on the water ine, and have 72 feet beams. Their dis-lacement is 11,525 tons, and they speed



HE DOUBLE-COMPOUND MAIN DRIVING ENGINES OF THE BATTLESHIP OREGON.

nd which brought her from San Francisco to Cuba without accident or delay.

bout nineteen miles an hour. As these vo battleships are considered the best loat, it will be perceived that so far as uality of workmanship is concerned the nited States ship builders need fear no mpetitors.

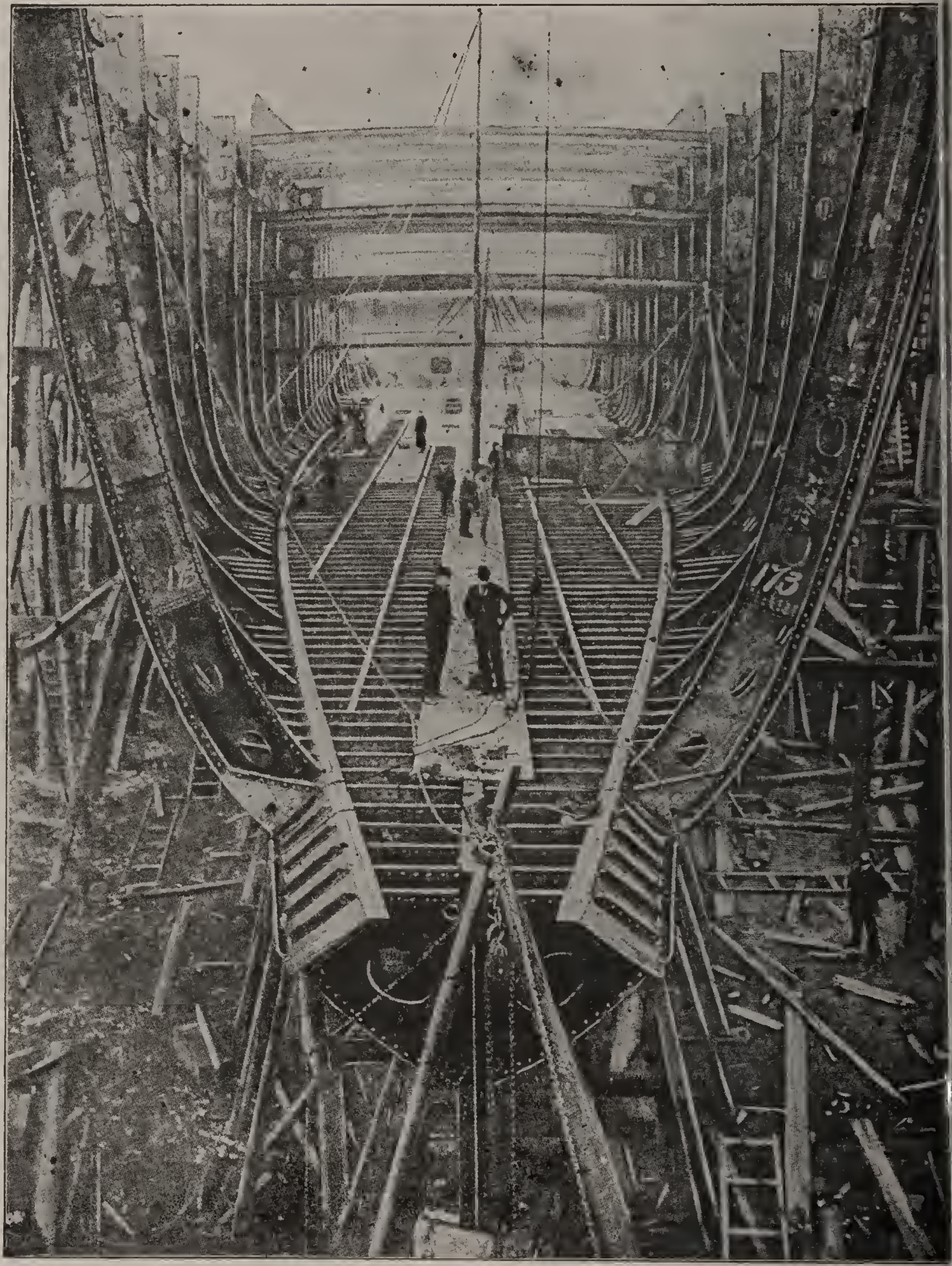
In case a ship fails to make the speed quired in the contract, the builders have pay a penalty of about $100.000 for very mile and an eighth below the total number of miles which the boat is supposed to make inside the hour limit.

There are two distinct portions of ship building: the theoretical, known as naval architecture; and the practical, called ship building. Every ship must possess certain qualities, the chief of which are buoyancy, stability, speed and handiness. At the same time the nicety of relationship among these requisites must be maintained, as, to some extent, they neutralize one another. Here is where the skill of the naval architect must appear.

In some vessels the greatest possible speed must be attained. An increase of length gives an added displacement of water, and consequently enlarges the carrying power. If this is not the prime desirability finer lines are permitted for and aft, and the speed of the ship is heightened. Increasing the breadth of the beam gives to the ship more stability. Three plans are made by the naval architect. The sheer plan shows all the lines of the length and height; the half-breadth plan indicates the lines of the breadth and height, and the body plan reveals the breadth and height.

How Constructed.

Steel, which is most largely used by ship builders of the nineteenth century is as much superior to iron as is iron to wood. The laying of the lines of the vessel is the first step in construction. The keel, made up of several thicknesses of steel, scarped at the ends and riveted together, is placed in position. In the middle of the keel a center plate, which later is carried upward and through the floor of the deck, forms a keelson. On either side of this is a thick bar, and outside all these are put the two lowermost plates of what is known as the "skin," bent downwards. The ribs, in a steel or an iron ship, are termed frames. They are first heated until white, and then bent to the requisite curve. Before fully cooled they are put in place on the keel by a score of workmen with the aid of the riveting machine. To the frames are fastened the floors of the ship. These are narrow plates running across the vessel. Then the beams, which support the decks, are thrown into position and the form of a boat begins to make its appearance.


THE IRON RIBS AND KEEL OF A MODERN MAN-OF-WAR
A SHIP-BUILDING YARD,

After the frames, beams and floors are finished, the putting on of the heavy outer plates commences. When this is at length completed the deck beams are further secured and stiffened by longitudinal and diagonal plates called stringers. No vessel built since 1890 is without the safety appliances which are now considered indispensable. For example, a false bottom, constructed seven or ei feet above the real bottom of the ve makes the striking of a rock at se danger by no means so formidable a the early days when such a means for tection was unknown. Compartments, built that the ship can be divided up in twenty-six or more sections, also co tribute to the safety of the thousand a more passengers who are housed in ocean greyhound during a voyage.

case a fire should break out in any part of the ship, by closing in that particular part of the boat the spreading of the conflagration can invariably be prevented.

The bulkheads, in addition to furnishing the water-tight safety compartments, also lend greater transverse strength to the ship. By the time the external plating is finished it is time for the launching but much yet remains to be done. The greater part of the decks has to be laid; the whole of cabin fittings needs to be put up; the rudder and steering gear require adjusting; the wooden ceiling, which lines the hold, has to be constructed; the masts have to be set, and the rigging strung, and finally the massive engines and the ponderous boilers lowered into the hold and made secure against the pitching and tossing of the ship. With the encouragement given to American ship building since 1898 it is openly predicted that before 1920 no market in the world will have an equal amount of work to do; and when this time arrives England will be forced from the position which she has so long maintained in the shipping industry.

MODERN MAN-OF-WAR

GREAT ARMOR PLATE

America Produces the Best Steel—Crude Iron Ore Used—What Steel Is
The Molding Process—Thickness of Plate.

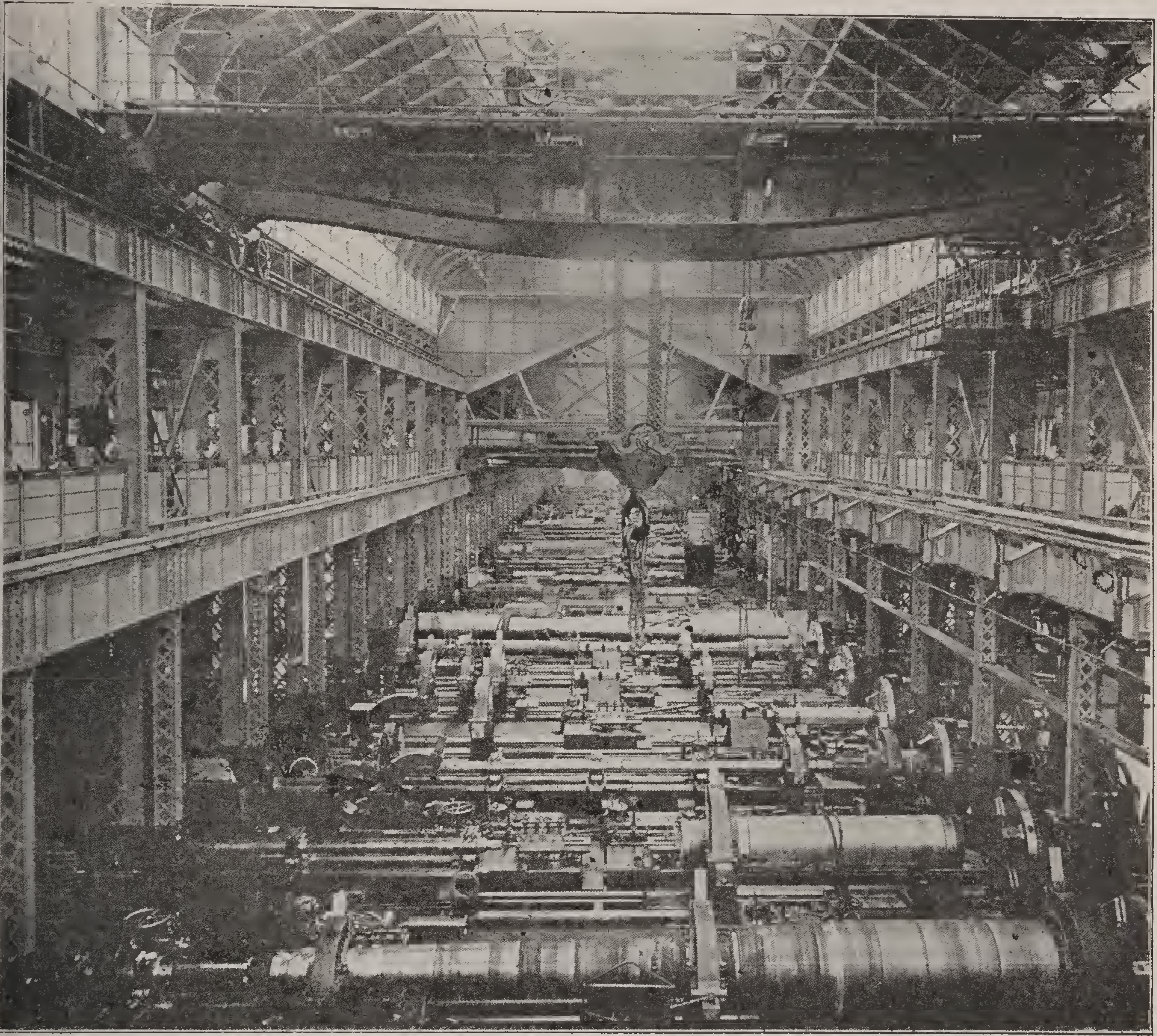
AMERICA enjoys the distinction of producing the best steel in the world, and in such quantities is it sold abroad that other countries are becoming jealous of her prowess. One of the most wonderful processes in the realm of steel working is that which converts from the crude iron ore just from the mines the monster hundred-ton plates of steel two feet thick, destined to adorn and protect the sides of the great war vessels of the world from the angry missiles of a foe.

When one considers that in 1895 we exported to Great Britain but fifty-nine tons of unwrought steel, and that in 1898 30,000 tons were shipped to that mart, it may be seen how the American industry has grown. At south Bethlehem, Pa., is operated one of the best and greatest plants in the world for producing almost impenetrable armor plate. Here daily are operated engines of science that wield masses of metal of such enormous weight and exert forces of such tremendous power that it would seem that all the giants of mythology were imprisoned he doing the bidding of the quiet men w conduct them. A glance at the meth in operation at this plant may be instru tive.

What Steel Is.

Steel is the result of a combination pure iron and carbon. (See article steel rails.) After the process of blasti has removed all the impurities from t iron, and it is run off into the sand flo to cool into "pigs," some particular sy tem is used to model the huge whit heated ingots into their desired shap For tools the system is called the crucib process; in making steel rails the Be semer process is the one most employe while in making heavy sheet and pla the open hearth method comes into t foreground.

This last method is employed pri cipally because of the intense heat gene ated. By it no other enclosure for t pig iron and the other ingredients needed than the furnace walls. Aft the iron ore has been reduced to pigs it arried, often while still hot, to the open earths, where mixed with its proper uantity of carbon, generally in the form f scrap steel, it is treated to a heat of ,000 degrees Fahrenheit. The manner f producing this heat is unique. Coal aving been treated to a great heat in r-tight ovens with but a limited supply air gives of an intensely hot gas. This as is passed through firebrick passages iat open over the hearth where the on and steel are awaiting it. Here a ill supply of air greets it and it bursts into flame. The combustion produces a terrific heat, and quickly converts the iron and scraps into flaming steel, with heat thrown off from it seemingly as great as that from the sun.



HE GUN-TURNING ROOM OF THE UNITED STATES GOVERNMENT AT WASHINGTON

Where the final touches are being put on the nation's defenders.

To carry off the spare gas and hot air another firebrick passage is arranged opposite the one which originally conducted the gas to the hearth. The escape of such an amount of intense heat of course warms up the escape passage to a rather tropical condition. Every twenty minutes to save heat these passages are reversed and the gas generated in the ovens is now brought out to the hearth through the already heated passage that a few moments took away the escaping heat. This method saves a great amount of heat, and is one of the great principles of open hearth heating. At the Bethlehem works there are eight of these great heating hearths, four capable of accommodating forty tons of metal each, and the other four twenty tons each.

Molding Process.

After the heating has gone far enough the steel is run off into huge caldrons running on rails, and is thence ladled off into molds that also run along tracks. The method of pouring into these molds is peculiar in that it does not splash the steel, but rather gently runs it into a side tube which allows the mold to fill up slowly from the bottom. This "bottom filling" process does away almost entirely with the uneven qualities of steel produced by old methods. As a further guard against bubbles and escaping gas and air the inner sides of the molds are constructed with a kind of metal lathwork covered with sand, which allows the escape from the hardening steel without marring its grain. The process of hardening differs from the old style hammering, for such a method is likely to create flaws. The process used at Bethlehem is what is known as "fluid compression," which by hydraulic presses exerts a pressure of seven thousand tons while the metal is still in molten form. These tremendous ingots from which immense guns or crank-shafts for steamships are made often weigh as much as 120 tons, and take days to cool off.

After an ingot has cooled off sufficiently to handle, the great traveling cranes pick it up and take it to a furnace where it is heated over again to a temperature of 1,200 to 1,500 degrees. The ingot is here likely to crack if not reheated just in the proper manner, so great care must be used in its handling. The enormous cranes that carry it about weigh themselves something like 175 tons each, and the engine that operates them exerts the power of 1,500 horses. After the reheating process the ingot is again treated to the hydraulic press for shaping, but this time the pressure is that of 28,000,000 pounds. This method of tempering is vastly better than the old hammer method, for formerly when great castings were manipulated by hammering, the effect of the pressure would not be felt far enough below the surface, and only the case would be hardened sufficiently to withstand the strain on it from usage as armor plating, gun barrels, or crankshafts.

Preventing Cracks.

To prevent any cracks or inequalities, therefore, in the steel, the reheating and hydraulic pressing process is repeated several times, and at last a final heat treatment called annealing may be given, or in the case of a crank-shaft it may suddenly be dropped into a tank of oil, which prevents crystalizing, and is called oil tempering. One would think that after this last treatment of tempering the steel would be rather unwieldy for trimming or paring into shape, but science has overcome these great difficulties, and great buzz saws eighty-four inches in diameter and with seventy-six inserted teeth can saw in two a plate thirty-three feet long and two feet thick. Lathes are also employed that will take a great blank of steel destined to become one of the navy's big guns and pare it and shave it down to its proper size. In making armor plates after the tempering has ne on to a certain degree the plates are stled over to great hydraulic presses at straighten them out and prevent arping Others are taken to other esses that exert a tremendous pressure, d bend them up into shape to fit the ssel for which they are intended.

After the plates have been finished they ust be tested to see that they are suitable for service in the navy. All the time e operation has been going on, government officers have been examining the process and the material. Now they select what ey believe to be the poorest specimen roduced and take it to the testing ground r a practical test. It is propped up with mbers, and at a certain distance from it nnons are placed which fire point blank eir charges of steel balls into the new mor. Some of the missiles only scratch the plate, others dent it, and still others go clear through. If the plate is worthy of use and stands the test, the whole batch that has been made is received by the government. If not the next poorest plate is subjected to the test, and if it meets a like fate the whole batch is condemned, the cost of the manufacture is met by the contractor, and a new set must be made. The styles of armor plate most successful have been those invented by Harvey and Krupp, though the latter is now ahead in protective qualities. Its surface, strange to say, is full of little cracks and seams, but the makers and government experts know that beneath lies a strength almost impenetrable, and dare not tamper with it beyond giving the simple coat of paint that adorns the ships of the world's navies.

SECTION OF ARMOR PLATED U. S. CRUISER

TEA GROWING

Can be Raised in the United States—Difficulties to be Overcome—Cost of Home Labor—Tea Farming in South Carolina

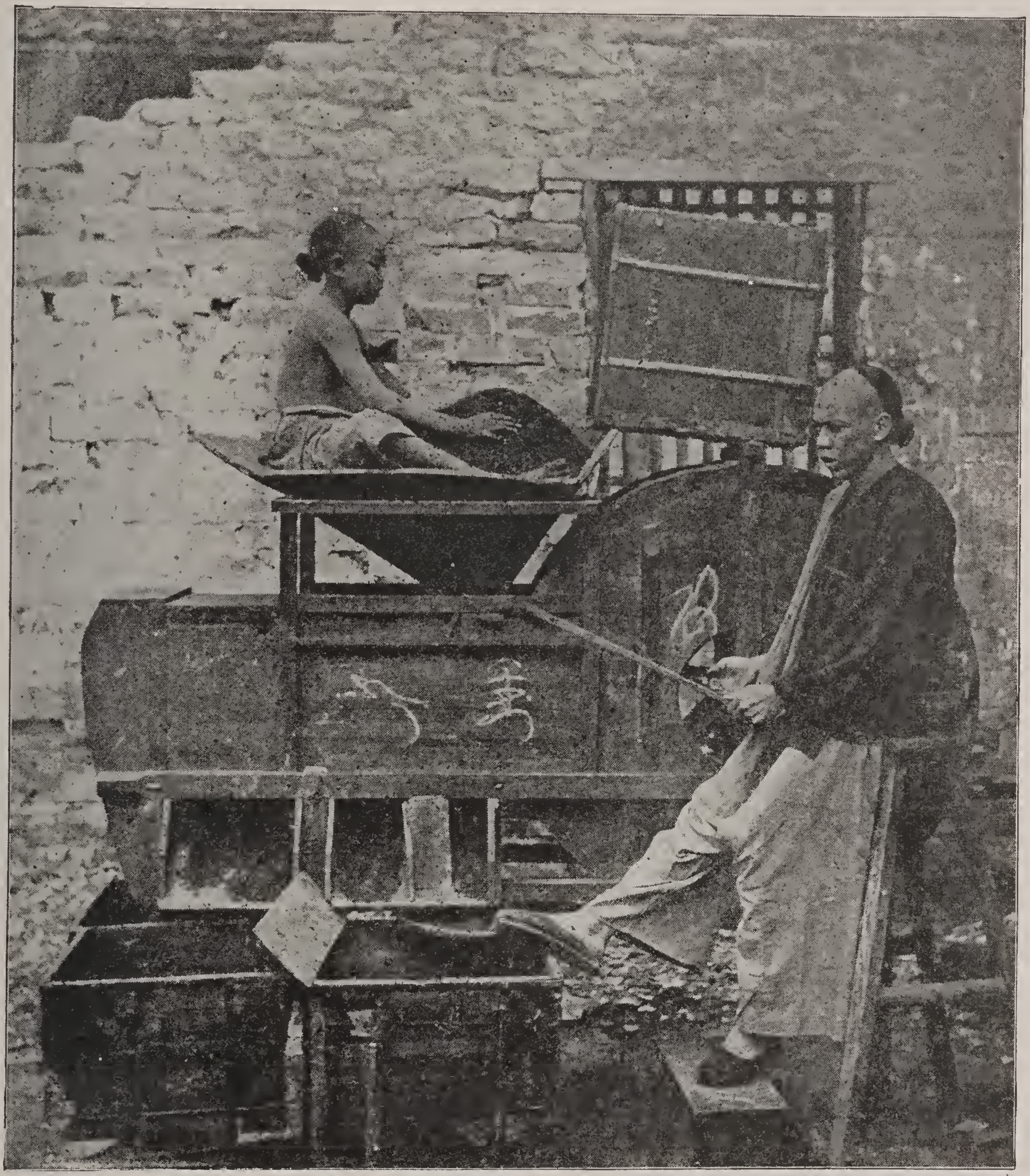
THERE is but one tea plantation in the United States. That is at Summerville, S. C., and it is the property of Dr. Charles U. Shepard. Here has been demonstrated the fact that it is possible and practicable to raise tea leaf in this country. According to Dr. Shepard, the cultivation of the tea plant, with a little economy, can be made a profitable industry, and he predicts that in time the United States will no longer be dependent upon the Orient for the means wherewith to make one of the most common American drinks. This tea plantation was first tried merely as an experiment. Seed was brought from the famous tea gardens of China and Japan. The authorities at Washington heard of the efforts to introduce the plant, and a commissioner was sent to investigate the matter. He made a favorable report. Dr. Shepard claims that his plants produce more leaves annually than do those in either of the countries from which the seed was brought. The products of the garden have always found a ready sale and command prices equal to that demanded for excellent brands of Oriental tea.

The crop in 1899 amounted to eleven hundred pounds, but much more is ex-

TEA PICKERS OF CEYLON.

Working on the plantation gathering the green leaves for drying and preparation.

cted of future seasons. The most im- rtant things to be considered in growing e plant in this country are the price of bor and the yield per plant. In Amer- a it costs as much per pound almost to k the fresh leaf, owing to expensive or, as it does in the Orient for the rais- , picking and packing of the same ount. The problems facing the erican tea planter are two: he must her cultivate a much better brand than that imported, or he must materially reduce the expense of labor. In fitting out a plantation a well-equipped factory is indispensable. The leaves must be spread out to dry, rolled, and be oxidized; all of which require machinery and space. The total cost of maintaining a factory capable of producing fifty pounds of dried tea daily may be estimated from fifteen hundred to two thousand dollars annually.



CHINESE WINNOWING TEA.

Somewhat like our old method of fanning wheat, with the exception of the youthful feeder.

THE WORLD'S WHEAT.

The Cry for Bread—Annual Wheat Supply—One Barrel of Flour for Each Human—Danger of Lack of Supply—When Wheat Ripens.

EUROPE feeds off America, and off wheat at that, for though Europe raised in 1898 1,548,881,000 bushels of wheat to America's 758,000,000, her nations eat so much more bread proportionately that ere the year is half gone she cries to us for food. Not only is it Europe we supply, but the frugal Chinaman, who, having tasted our wheat bread, calls it good, and is wont to forsake his rice and chopsticks for it.

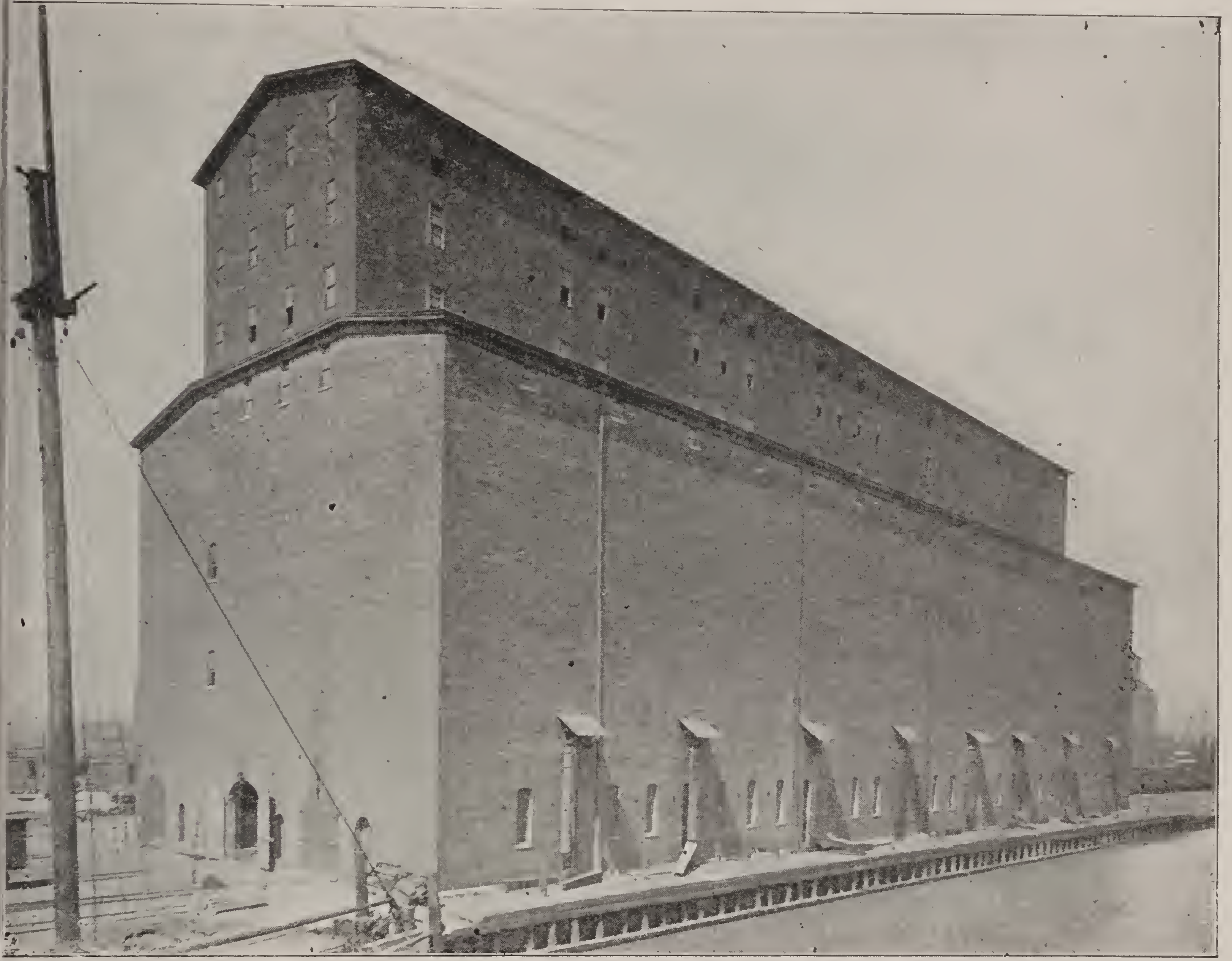
In round numbers, there are to-day 517,000,000 bread eaters in the world. Each year there is added to this number nearly eight millions of people who clamor for bread. Part of these come from increase through new births; more are added by cultivating a taste for wheat. The average wheat flour consumed by each person through the year is about one barrel, or four and one-half bushels of wheat. Americans eat a little more than this average, while the Frenchman and Briton eat still more, and the Russian and German less. At an estimate, then, the bread-eating world requires each year over 2,300,000,000 bushels of wheat to supply its table with bread. In 1897 the crop fell short of this mark by nearly a million bushels, creating high prices in the less fortunate lands, and even causing famine in India. With some fear, it is viewed by scientists like Sir William Crookes that by the year 1931 the world will be crying for more bread than can be supplied by the farms of the entire globe. To show to what an extent nations depend upon the wheat-raising countries, England, whose population consumes her entire crop in thirteen weeks, must needs be supplied for the rest of the year from America, Russia or India, or else die of starvation. In time of war if the United Kingdom were blockaded for three months the whole country would be depopulated. The nations must live on wheat, and to procure it all things possible are done.

Tide of Wheat.

The tide of wheat traffic flows principally from west to east, and from south to north. There are a few exceptions to this, as where America ships to Brazil and China, and Russia and India ship to England and the rest of Europe, but in the main the great traffic is across the Atlantic. The American, while a great bread eater, does not quite forsake his potatoes, and consequently sends his surplus wheat where he can get the best prices. Gigantic as are American projects in general, the calling of the wheat trader commands the admiration of all. The life of the American public depends on the livelihood of the American farmer. When crops are good general business conditions are buoyant. The man who buys and sells wheat for his vocation eals in such enormous fortunes and with uch quantities of the life of nations that e world at large almost bows down to im.

Both the farmer and the trader keep formed as to the exact condition of the arkets the world over, and so far has ivilization and business instinct entered nto the work of the former that he has ven had telephones put upon his farms, nabling him at once to learn the exact pot where he can sell his product at the ighest price.

So great are the transactions daily in his commodity that the dealers on the boards of trade when they sell "10 wheat" mean 10,000 bushels, and not merely ten bushels. In spite of his great eagerness to dispose of his stock, he never sells down below a certain huge surplus. For instance, July 1, 1899, the "visible supply" in the great terminal elevators at Chicago, Duluth, and Minneapolis together with wheat in transit measured 74,000,000 bushels. The invisible supply in the hands of the farmer roughly estimated was 70,000,000, making a total of such proportions that it is easily explained how a Leiter could not "corner" the wheat market.



A CHICAGO GRAIN ELEVATOR,

n the banks of the Chicago River, one of the largest of its kind in the world, capacity 700,000 bushels. The grain stored is shipped to Europe.

When Wheat Ripens.

Let us follow the movements of this cereal from the harvests to the consumer. At the bottom of the world in Peru and the south of Africa along in November the wheat begins to ripen for its cutting. In December follows the harvest in Burma; in January, Australia and Argentine; in February and March, the East Indies and Upper Egypt; in April, the wheat belt of Asia Minor, Persia, India and Mexico. About May wheat begins to ripen in the lower part of the United States, Japan and northern Africa. When June comes our great harvest begins in earnest, and continues until the last wheat of the Red River Valley is gathered along about the first of September. With this march of the harvests goes the migration of the harvesting hands. Early in the spring he appears unkempt and poverty-stricken, ready to do a man's full work for double wages. And he gets the wage, too, and then disappears to spend it, reappearing the next spring to resume the old task. It is estimated that his tribe numbers at least 50,000 men. This army by means of the latest improved methods of harvesting, reaps, binds, thrashes, and stores up the wheat for sale to the elevator men.

A SCENE ON THE CHICAGO RIVER,
Where grain boats destined for Buffalo are taking on loads for carriage across the Great Lakes.

The primary movement of wheat is toward the local flour mill, where it is ground up to supply the farmer's family, and toward the granary, where it is stored up for the next planting supply. In the States where the crops are not large the supply is consumed almost entirely at home, and in many States not so much as a kernel gets away to supply other peoples. When the farmer gets all he wants for himself he begins to think of making a profit. This selling surplus in 1898 amounted to 400,000,000 bushels. Of this something less than half is consumed in our cities, while the rest goes abroad either as wheat or flour. There are three general methods for selling this surplus.

INSPECTORS AT A CAR OF GRAIN WHICH THEY ARE TO GRADE.

The farmer who owns acres in the thousands and who can afford from two to ten thrashing machines often maintains one or two elevators on his ground, where he can store his supply until the time when he can dispose of it at a good price. Such men who do business on the wholesale plan often make as high as $30,000 net yearly. Then there is the class of farmers who, though less extensive growers, keep a close acquaintance with the commission men in the great trading centers, and order cars for themselves, shipping their grain direct to the dealers who pay the highest figures. Often they are so enterprising that they sell on the boards for future delivery.

How Farmers Sell.

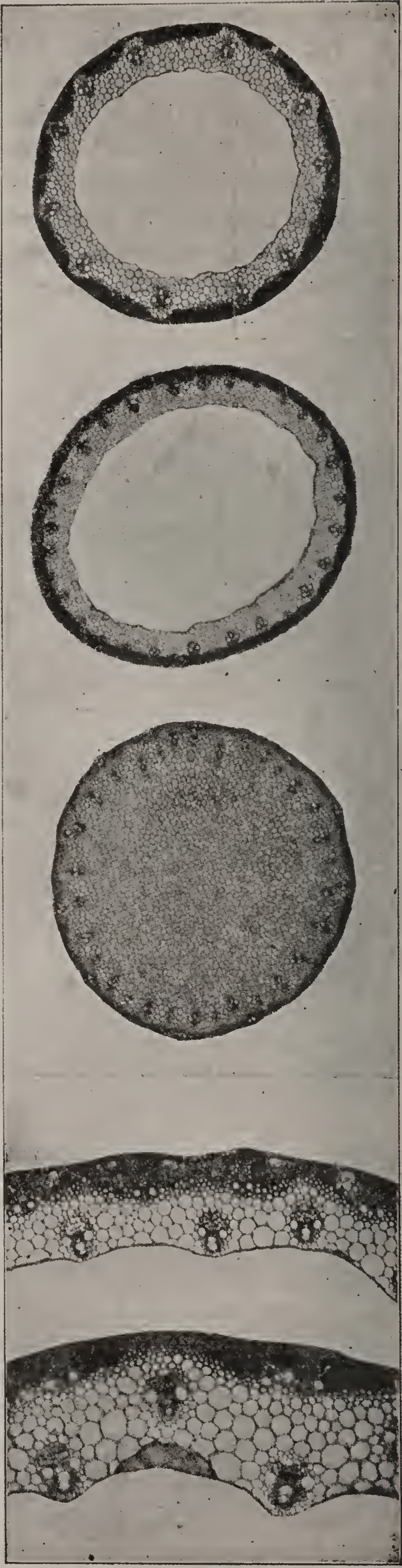
The great mass of farmers, however, still sell in the old-fashioned way to the local elevator men. To be sure, they keep thoroughly informed on market quotations and sell accordingly, and if prices at the local buyer's hands do not suit him he combines with his neighbors and emulating his larger brothers ships direct to Minneapolis, Duluth or Chicago. The elevator companies at the great centers control warehouses along all railroads, and on water lines throughout the wheat growing districts, and so great is the demand for the commodity that as soon as a local elevator secures a new supply it is telegraphed to the headquarters at the trade center, and is almost as soon disposed of. So rapid is this operation that two-thirds of the year's supply is generally sold before the year is half over.

System of Grading.

Perhaps no other one thing so facilitates in the movement of wheat as the system of grading. Time was when every prospective buyer had to inspect each load of wheat for himself, and the business of trading was full of time-consuming details. Lately, however, the state governments or local boards of trade and chambers of commerce have stepped in and superintended the grading, so that wheat may now be bought safely with the assurance it is of a certain uniform quality. In Minneapolis, which is the largest primary wheat center of the world, this system has reached its perfection. It is controlled by the State Railroad and Warehouse Commission, and meets every August in St. Paul for the purpose of establishing grades for the next year. Grain men from everywhere are invited to be present and make suggestions. In 1899 there were eighteen grades, of which the following were the first two: No. 1, Hard Spring Wheat, which must be sound, bright and well cleaned, and must be composed mostly of hard Scotch Fife, and weigh not less than fifty-eight pounds to the measured bushel: No. 1 Northern Spring Wheat, which must be sound and well cleaned, and must be composed of the hard and soft varieties of spring wheat.

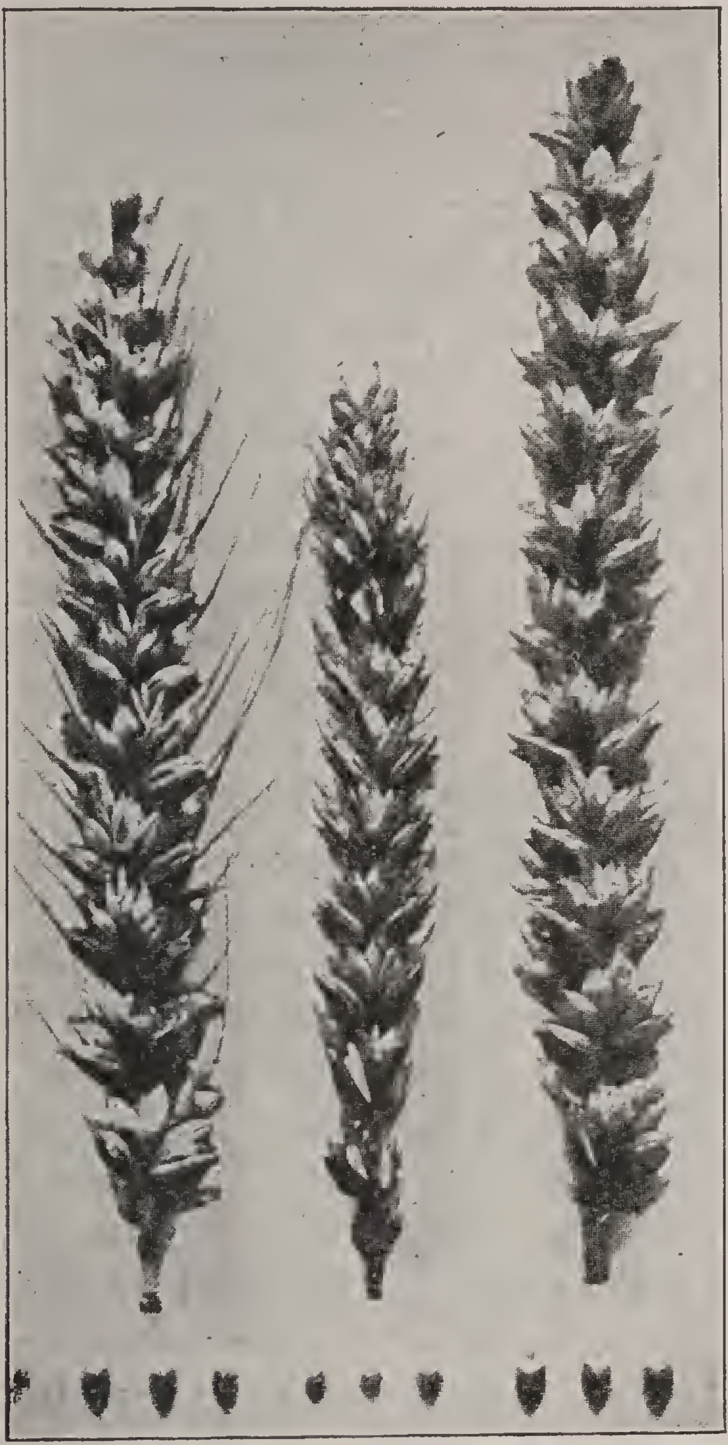
Grain Inspection.

Early in the morning the deputy inspector and his assistants start out to the side-tracked cars full of wheat for their marketward trip. One man goes ahead and records the initials and number of the car, and sees that no one has tampered with the seals. Then comes another who breaks the seal, and then the inspector who delves into the wheat and by sniffing here and taking a pinch there grades its quality. Sometimes he plunges a long hollow tube into the wheat to see that no "sharper" trader has put in a layer of poorer quality. Sometimes he finds it necessary to weigh a quantity in his little brass kettle to see that it comes strictly



After building up the ear, or head of grain, it is necessary to build up a straw capable of supporting the increased ears. The top photograph exhibits a transverse section of the original variety of straw. The outer opaque rim is practically solid to resist the influence of the weather. The inner substance is a mass of cells acting as stays and giving it the necessary strength. The dark bundles near the outer rim are a series of helical springs. These helical springs enable the straw to bend without breaking. The second illustration shows the number of these helical springs increased. The third shows a further increase in these helical springs with interior cells increased so much p to the law. Generally, however, they re so expert that the quality can be told y the mere handling. And the system s honest, for the inspectors do not know vhose grain they are inspecting until after t is all done.

Besides this the process includes filling ittle bags with samples from each car and sealing them with their respective initials and numbers for shipment to the chamber of commerce, where set out in little tin trays they form the basis for the next morning's trading. After the inspector has finished his work the cars are re-sealed by the State to await the disposition of the purchaser. Records are kept by the State until the grain in question has passed out of the market. It sometimes happens that a commission man thinks that the grain sent to him is of higher grade than that given it by the inspector. In that event, if he so wishes, he may have it inspected again by the State board, which, if the grade has been incorrect, pays the expense for re-examination: otherwise the trader must stand it. In 1898, of 220,777 cars inspected in the State of Minnesota, only 16,104 were complained of, and only half this number were incorrectly inspected.



The wheat ear in the center shows the grain before cultivation, only half of the head containing grains, and those small in size, as shown immediately below the ear. The wheat ears or heads on either side show the grain after artificial cross fertilization. This operation necessitates the opening of the case and the removal of the pollen while in an immature state. Later the pollen must be procured from the species with which the cross fertilization is desired and placed in the pistils of the species first operated upon.

In the wheat pits of the boards of trade is done the greater part of the transactions that send the supply all over the world. Here about ten o'clock in the morning, after the samples have been received from the cars, traders, millers and elevator men swarm about the tables arranging deals for delivery of millions of bushels of wheat. Dials on the walls indicate the fluctuations in price according to sales in other cities. A miller wishes so much wheat at a certain figure; it is sold, an easy transaction. But further than this and what has brought the boards of the world into disrepute, is the custom of selling for "future delivery."

Trading in the Sixties.

Back in the sixties, when transportation was difficult, traders up in northern Minnesota had to buy wheat in the fall, store it all winter, and then ship it down the Mississippi in the spring, without the least idea of what price it would bring. The traders had to buy at a low figure, and stood equal chances of losing or gaining enormously. From this grew the custom of selling for future delivery wheat that was then on hand. This in itself was businesslike enough, but from it has grown the future sales of wheat by men that never have the possession of it nor who ever expect to have, simply a vast system of speculation. Yet it is one that has its conveniences, for it creates markets, and facilitates the swift movement of wheat without the exorbitant costs of grasping middlemen.

After the wheat has been sold, elevator certificates are given for its delivery. These receipts are accepted by banks on loans for almost their face value, and naturally both the banks and State watch the elevators to see that absolute trustworthiness prevails. The great elevator centers of the United States are Minneapolis, Duluth, Chicago and Buffalo. These great steel buildings fitted with every facility for storing, cleaning, drying and scouring wheat and other grain hold from 1,000,000 to 2,500,000 bushels. Great spouts called "legs," through which run moving bucket-belts, are pushed down into the holds of ships or into cars, and the grain is rapidly sucked up into its proper bins. In the holds of vessels gangs of men stand knee-deep in the wheat and shovel it in front of big shovel plows run by steam, which in turn dump the grain into the "legs" for carrying upwards. A cargo of 180,000 bushels can thus be unloaded in a few hours, and when it is considered that at the same time "legs" from the opposite side of the elevator may be re-shipping the grain into cars ready for the seaboard, the magnitude of the operation may be apparent. And all this is done for about one cent a bushel.

Wheat Goes East.

Directly resulting from the storing the grain in the great elevators pendi sale and shipment comes the growth the great eastern movement of wheat the United States and the added millio in revenue to the great steamship a railroad companies. Lake transportati is the cheaper for grain, and costs b three-quarters of a mill per ton per mil Situated as all the elevators are, very ne the lakes, the business of transportati of wheat has grown to enormous propo tions. Grain shipped by cars to Chica and Duluth, and by river to Minneapo finally reaches in most instances the el vators at Buffalo, where, either by rail canal, it is re-shipped to the seaboar thence to find its way to Europe. Th cost of the transportation of one bush of wheat from Minneapolis, includi three reshipments at Duluth, Buffalo a New York, to almost any point in wes ern Europe is but twenty cents. It curious that it costs almost as much transport the same from the Dakota whe fields to Duluth alone.

And what of the profits accruing fro this great wheat industry to the people America? From about 4,000,000 barre of flour shipped abroad in 1875, our tra has grown to nearly 20,000,000 barre American flour is shipped 5,000 miles compete with Russian flour, and even t Chinaman is now gladly using our poor grades. In ten years our flour trade wi Japan has increased elevenfold. Th total foreign sales for 1899 were $17 000,000, of which Great Britain to $100,000,000 worth. The farmer is gro ing prosperous under this great produ tion. His estimated gains run from 5 12 per cent of his invested capital, a with all the modern improvements a facilities his enormous yearly crop r ceipts average nearly $400,000,000.

MAKING FLOUR.

Vast Gain Made in Modern Mills—The Stones that Are Used—Experts Studying the Problem—Largest Mills Are in the United States—English Methods.

VAST changes have entered into methods of flour milling since the days when two heavy stones were used by hand to crush the flour from the wheat. In 1900 the machinery employed in the largest mills and the best in the world, viz., those in Minneapolis, Minn., is far in advance of the kind used ten years previous. Experts are continually at work devising contrivances which will lessen the cost of grinding flour and at the same time act in a beneficial way upon the finished product.

In ancient times wheat was placed between a large convex and an equally large concave stone, which fitted into each other in a sort of crude fashion. A strong pair of arms then supplied the power which crushed the flour out of the wheat, but the process was slow and arduous. The first real step in the direction of progress came with the introduction of the quern, which is still used in the Shetland Isles, the Faröes and in some other places. The main difference between the quern and the more modern mill stones is in the size of the upper stone, which now is made larger to permit the turning to be done by water, wind or steam power. Again, the more modern mill stones were, for the most part, made from buhr stone, a sort of silica much like flint in point of hardness, but not so brittle.

THE PILLSBURY FLOUR MILLS AND ELEVATORS AT MINNEAPOLIS, MINN.

The largest plant of its kind in the world and operated by steam and water power.

Mill Stones.

The usual size of a mill stone is four or six feet in diameter. It is made up of a number of pieces of the material, strongly cemented, and then bound together with iron hoops. The grinding surface of the mill stone is grooved. These grooves are cut perpendicular on one side, and with a slant on the other.

Power is communicated to the upper mill stone by means of shafting which is at the end of a spur wheel. The lower mill stone remains stationary, and the grain, poured into a hole in the top of the upper stone, comes between the two and is ground into flour or meal by a force called centrifugal. The finished product passes from the enclosed mill stones down through a spout into what is called the worm, which cools the flour or the meal while carrying it along to the elevators. The elevators raise the product to the silk dressing machines.

This machine is really nothing more than a cylinder. Prior to 1885 it was usually made of wire cloth of several degrees of fineness, thus separating the flour into a variety of qualities, the finest passing through the first portion in the cylinder, the next finest through the second, and so on; no part of any of the screens being fine enough to let through the bran, which passed out from the end of the cylinder. Hoppers were placed below the dressing machine—and are used to this day in some mills—and with their aid the flour and bran are run into sacks.

English Methods.

Some of the large English mills are driven by steam engines, and though they are far ahead of the mills of 1850, they are, in many respects, several degrees behind the more enterprising American methods. In the best English mills the wheat passes through a series of cleaning machines—rapidly revolving beaters inside an iron case—and then through winnowing machines. After being slightly crushed by iron rollers and passed through a sifting machine, the wheat is finally crushed between from thirty to fifty pairs of mill stones.

It is then sifted through silk cylinders; first to separate the bran and then the middlings. Such a mill will produce 1,000 sacks of flour in a single day. Despite this large quantity the best American mills, with the most modern improvements and with a larger capacity, will quadruple this amount, and even do still better under pressure. Among the most valuable improvements of importance since 1875 is the high grinding system which is in use in all the foremost mills in America.

Some Modern Improvements.

This does away with mill stones, and brings into operation rollers, either porcelain or chilled iron, which are more suited to the hard wheats. As a result, the wheat produced is of a finer quality. The method originated in Hungary, which has long led the continent in the production of flour. The middling purifier is another important factor in modern milling methods. The principle is a series of horizontal sieves kept constantly in motion, through which passes a current of air driven by a fan. Following this the middlings, after being put through the purifier, are ground by porcelain rollers and dressed through silk, after the manner of ground wheat. These middling purifiers are the leading feature in America, which no longer knows the mill by the side of a convenient stream of water. A few such are left, but they stand for sentiment and not for progress.

ELECTION OF POPES.

Manner of Choosing a Pontiff—The Rules Followed After a Death—How the Cardinals Meet and Vote—Singular Ceremonies.

ONE of the greatest elections in the world and one which interests all classes is the election of the Pope of the Roman Catholic Church. From the year 1 A. D., when St. Peter was the recognized head of the Roman church, until February 20, 1878, 261 popes were elected. In the early days the custom was to call a meetng of cardinals to elect a successor to the dead Pope in the Lateran or the Vatican basilica, or in the cathedral of any city in which they might have determined to hold the election. The old mode of procedure in papal election was abolished in 1247, when the rules and regulations of the conclave were settled. These still exist, and form the bulwark of the present system.

In 1247 Gregory X., who was similarly elected, called a conference of the great ecclesiastics with the object of establishing permanently the manner of electing the Roman Pontiff. A constitution was there drawn up and approved by the fathers. According to this constitution the cardinals shall celebrate the death of the Pope for nine days, and on the tenth shall come together for the purpose of electing his successor. They shall be accompanied by a single attendant, lay or clerical, or at most, in case of evident necessity, by two attendants. The conclave shall be held in the palace of the late Pope, and the cardinals

THE CATHEDRAL OF MILAN.

ne of the great Catholic churches of Europe, at Milan, Italy. The building was begun in 1387 and its extreme height is 355 feet.

must live in common, occupying one large room. One room, however, is reserved for private purposes. While in conference no person shall be allowed to converse with a cardinal, and communication may be had with only such outsiders as are called before the body to discuss matters germane to the subject. No letters or message may be sent under pain of excommunication.

If after three days the cardinals fail to agree, they shall be allowed but one dish of food at dinner and supper during the next five days. After that only bread and water will be given them until an agreement is reached. Nothing shall be taken from the coffers of the vatican while no Pope is in office. Nothing but the election shall be treated unless the temporalities of the Holy See are threatened. If any cardinal attempts to entice his brethren to his own side by offering a bribe, he shall suffer excommunication. Two-thirds of the votes of all present are necessary for an election. Voting by proxy is not recognized, but a cardinal may enter the conclave after it goes in session if he be detained on his journey. Any one, not a woman, a manifest heretic or an infidel, is eligible to the papacy.

GERMAN DUELS.

Students Fight for Glory—Give Each Other Many Scars—Battles that Last for Hours—Usually Fought in an Inn.

THE duels of German students have become famous throughout the world. Instead of turning to football and other athletics, these seekers of knowledge delight in broadsword dueling and exchanging wounds which leave scars on the faces of many for life. The practice is very common, and especially in the southern parts of Germany but little opposition is offered to the so-called sport.

Clubs, corresponding in a way to the Greek letter fraternities in American universities, are the organizations which support the practice. It is under the auspices of these that the tournaments and duels are held. It is as honorable for a student to have his face covered with scars in that country as it is for an American student to be covered with honors of th football field. Many of Germany's mos learned men are thus marked, and i many instances professors countenanc the "play."

The duels usually come off in a drinking house. The landlord in an out-of-the way place provides a room, the floor o which is covered with sawdust. The contestants for honors assemble here and do a tough jacket and guard, which is place on the right arm. This is used not onl to protect the arm, but also to parr blows. The seconds and friends of th duelists then gather about the room, an the fight is on. They slash and cut at on another with all the skill which come from long practice with the swor Sometimes the fight continues for hour as blood has been drawn on neither side. The face is the objective point in all attacks. If a slight wound is given one of the duelists, a halt is called until the attending physician examines the cut. Unless he thinks it sufficiently serious or that it will leave a big scar, the fighting continues as before, although blood flows profusely.

When the men are almost exhausted they become careless. Then it is that a chance blow decides the battle. When a good gash is made a final halt is called. The wounded student is put under the care of a physician, and the audience withdraws with the victor. Next day the wounded student, if he is able, appears as usual at his classes, with great strips of sticking plaster on his face. He is the hero of the hour, and is welcomed everywhere. These clubs often have tournaments in which all present participate. After one of these battles royal there is not a popular student in the school who does not bear some mark of the fray when he presents himself at his classes the following day.

THE MUSK OX.

Raising the Ox for its Fleece—Two Calves are Captured—The Herd in Sweden Now—Weight of the Fleece.

IN Sweden the industry of raising the musk ox for its fleece has been started on a large scale. After making many unsuccessful attempts the Kolkhoff Artic Expedition, which several seasons ago returned to Sweden from Greenland, succeeded in there capturing alive two calves of the musk ox, a male and a female, and in bringing them to Sweden in good condition. In this way the musk ox industry started.

At present there is a large herd of these animals, which are being cared for on a farm in northern Sweden, where all conditions are apparently suitable for their development. The musk ox (Ovibos moschatus) is a singular animal resembling both an ox and a sheep, as the scientific name "ovibos" implies. Its introduction into Sweden will be of great benefit to that country in the opinion of Kolkhoff, who, in flat contradiction to the statements of other zoologists, says that the flesh of the animal is not merely edible, but of very agreeable flavor. As a fully-developed musk ox weighs about 1,500 pounds, this is an important consideration.

But the principal value of the animal lies in its heavy fleece of dark brown wool of extraordinarily strong fiber. The fleece of a single musk ox outweighs those of twenty sheep.

MAUNA LOA.

Remarkable Group of Hawaiian Volcanoes—Their Destructive Power—Size of Craters—Enormous Flow of Lava—Eruptions of the Past.

ON the island of Hawaii there is a remarkable group of mountain peaks and volcanoes, originally constructed by hot matter hurled from the bowels of the earth into the ocean depths and then by successive eruptions built upward until the caps and craters of Mauna Loa, Mauna Kea, Hualalai, Kohala, Kilauea and Kulania rose above the waters and became at their visible bases habitable land.

Of this group Mauna Loa, an active volcano, has been in a state of perturbation for some time, indicating that an overflow was pending with accompanying tidal waves and earthquakes. When the steamship Australia left Honolulu in July, 1899, evidence was at hand that Mauna Loa was engaged in destroying herself. The lava flow was within ten miles of Hilo, the sky was overcast with clouds charged with gas, the sea was much perturbed, and sulphur smoke filled the air for miles beyond the shore lines.

On July 22, 1899, there was a severe earthquake shock in southern California, and at practically the same time a tidal wave in Lake Superior, neither easily explained unless it is assumed, until scientific explanation may be had, that way down in the interior of the earth there

THIS IS A CIGAR FACTORY IN MANILA, THE PHILIPPINES

Natives are employed exclusively and make a cigar now coming to this country.

might be found sharp traces of a seismic wave extending from boiling Mauna Loa to the uttermost parts of the earth and producing at Los Angeles and in Lake Superior the phenomena which troubled the people.

Mother Earth is as travail as she wills, and where her upper crust may be thin she finds a vent for her inward commotions, and the result at unexpected moments is an earthquake, a tidal wave, a destroying flow of lava. It is within the range of possibilities that, constructed as it has been by volcanic action, Hawaii—one of Uncle Sam's latest possessions—may be effaced from the map, sink back into the depths from which it came, and Mauna Loa and Kilauea become but names on the pages of natural history.

A GAME DINNER IN HAWAII.
The guests wearing garlands of flowers, a beautiful native custom.

Island of Volcanoes.

The Hawaiian or Sandwich group of islands consists of a chain of islands, reefs and banks running nearly 2,000 miles in the direction from northwest to southeast. The highest volcanoes and vastest caldrons of seething lavas are found in Hawaii, the largest member of the group, at its southeastern extremity. In Hawaii the volcano of Mauna Loa, or the Great Mountain, rises to a height of 13,760 feet, or about 3,000 feet above the vegetable zone. Her crater is in reality a group of craters, known in the native tongue as Mokuaveoveo. They open on the very summit of the mountain, forming a symmetrical cavity. In the center of this cavity is the vast primitive or mother crater, with a mean diameter of 6,000 feet, and a depth of over 1,000 feet.

Offspring of Mauna Loa is the vast lateral crater of Kilauea, which opens on the east flank of its parent. Northwest of Mauna Loa is Mauna Hualali, occasionally active. Still farther on is Mauna Kea, 13,850 feet in height, extinct and snow-capped. All volcanic eruptions of any importance in Hawaii are now confined to Mauna Loa and Kilauea, and it is around them that interest centers in view of the startling tremblings of the earth and the fear that Hawaii itself is doomed to a terrible visitation.

Destruction Predicted.

The natives of Hawaii have invested their volcanoes with fables and legends, have built up about them a mass of romance in which truth and imagination are so interblended that separation is impossible. If Mauna Loa finally overwhelms the island it will be no more than the natives say she has intended doing for some centuries past. These natives believe that Hawaii was formed by the bursting of a huge egg in midocean, one of the fragments of which became the beautiful isle from which rises the flame-kissed crest of Mauna Loa. The authentic part of the egg story is that past eruptions have created new lands in the Hawaiian group and formed the basis for it.

The legend tellers go on to say that after the bursting of the egg and the uprising of Mauna Loa something or other was done by the first inhabitants to offend the volcano and bring from it the threat that in punishment Hawaii should eventually be returned to the depths in which the egg first took form. Time and time again the lava has poured from the lips of Mauna Loa down onto the villages and fields, and almost but not quite carried out the vengeance. After each outburst of wrath the natives, on finding themselves and the island still in existence, express delight, but with a shake of the head say:

"Next time, ah!"

Gigantic Proportions.

The gigantic proportions of Mauna Loa and companion craters leave no room for doubt that they form one of the principal vents of the earth through which gases and molten matter are hurled out from the interior to the surface. Here are the proportions of the crater of Mauna Loa:

Area, 3.70 square miles, or 2,370 acres.

Circumference, 50,000 feet, or 9.47 miles.

Length, 19,500 feet, or 3.7 miles.

Width, 9,200 feet, or 1.74 miles.

Elevation, 13,760 feet.

These dimensions of Mauna Loa are simply those of the summit crater. The dimensions of Kilauea, the offspring, are:

Area, 4.14 miles, or 2,650 acres.

Circumference, 41,500 feet, or 7.85 miles.

Extreme width, 10,300 feet, or 1.95 miles.

Extreme length, 15,500 feet, or 2.93 miles.

If these proportions are considered extraordinary, what is to be thought of those of Haleakala, on the island of Maui, contiguous to Hawaii? Of course, Haleakala is not an active volcano, but its greatest crater of Maui is the largest in the world. Its dimensions are:

Area, 19 square miles, or 12,160 acres.

Circumference, 105,600 feet, or 60 miles.

Extreme length, 39,500 feet, or 7.48 miles.

Extreme width, 12,500 feet, or 2.37 miles.

Elevation of summit, 10,032 feet.

Elevation of cones in crater, 8,032 and 7,752 feet.

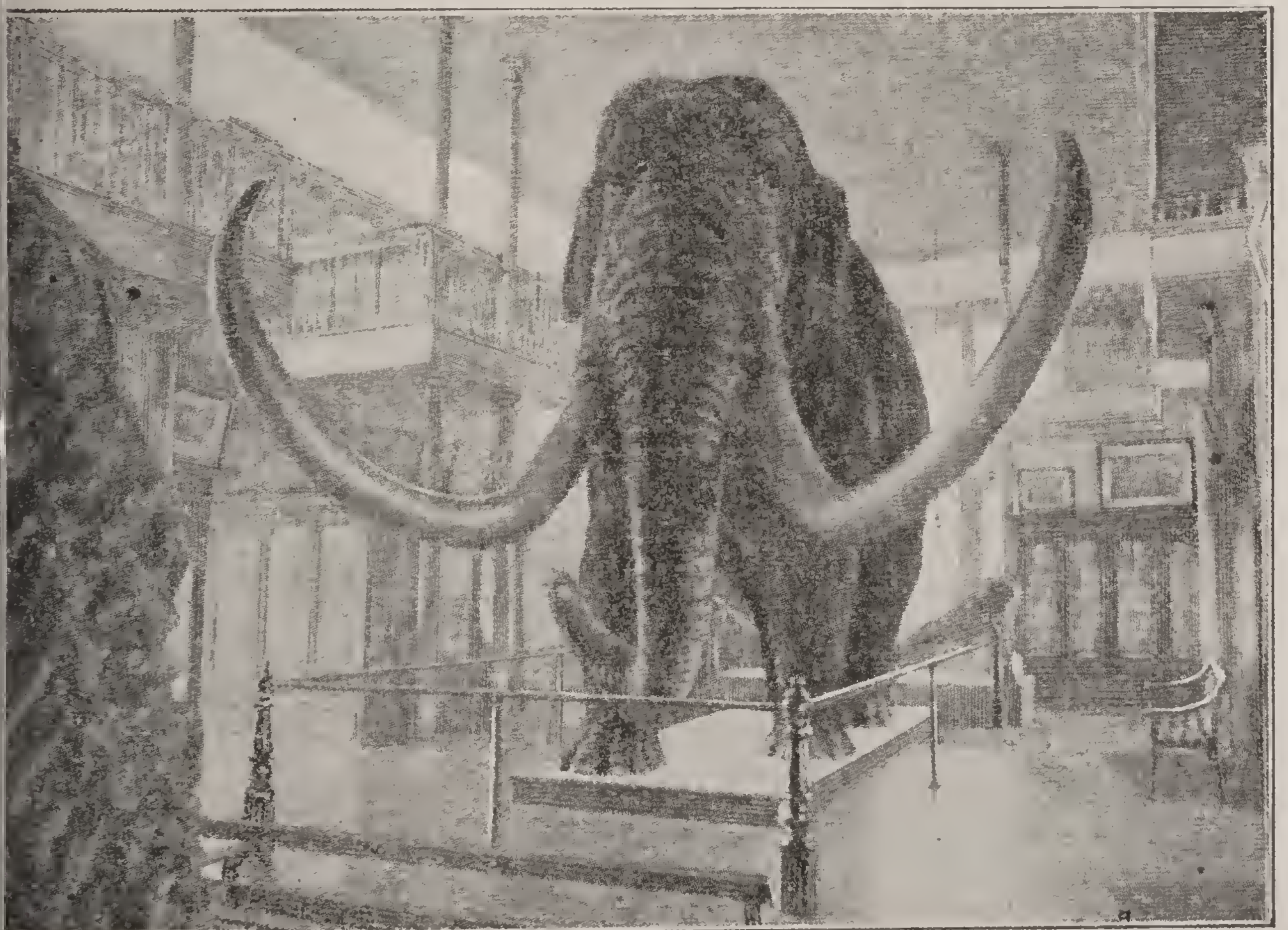
Elevation of cave in floor of crater, 7,380 feet.

So, if Mauna Loa is to-day the volcano queen of the Hawaiian group, a time was when Haleakala must have been supreme and afforded eruption spectacles such as earth may never see again.

THE MAMMOTH.

An Animal of Prehistoric Days—Tartars Find Its Bones—It Was a Huge, Hairy Elephant—Birthplace Unknown—May Have Come from Asia.

MUCH has been said about the mammoth, its origin, and its haunts when it stalked about the earth. To-day it is unanimously agreed that the animal s extinct, but we have remaining bones, tusks and other portions of the monster's body which give us a great insight into what the beast really was in its day. The irst record we have of the animal under a name in any way resembling mammoth s that in which a Russian describes some bones belonging to what the Tartars called a "mamantu"; later on we hear of it as "mammut," then "mammouth," and finally it came down to us as the familiar mammoth. The word to-day is generally applied to gigantic objects, but the name was not given to the animal owing to its extraordinary bulk. Exactly the reverse, however, is true, for the word came to have its present meaning because the original possessor of the name was a huge animal.



THE MAMMOTH OF ANCIENT DAYS.

Showing size of tusks.

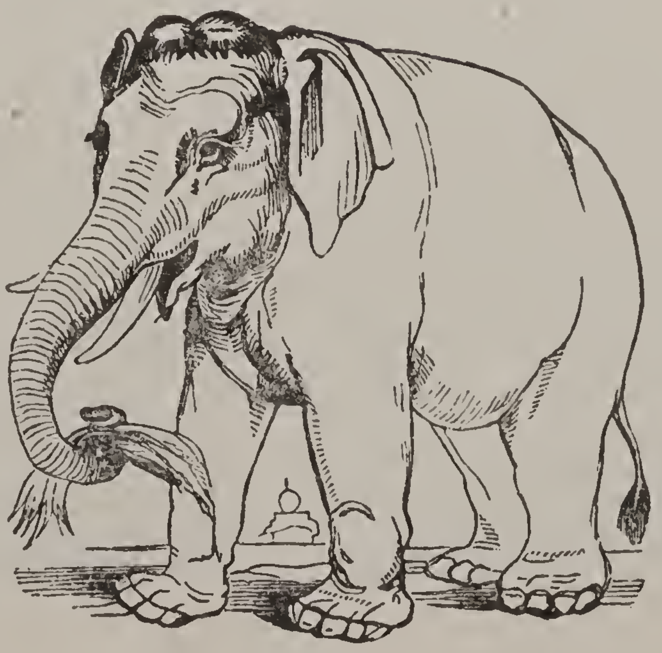
Nearly every one knows that the mammoth was a sort of big, hairy elephant, now extinct, and that it lived in the north. The existing elephant of Asia is a very near relative to the mammoth, and in fact may be called a first cousin. The general impression is that the animal was about twenty feet in height and that ordinary elephants would look insignificant in comparison. Such is not the case, and the result of much research is that the mammoth averaged about nine or ten feet. Of course, there were some giants in the family, and it is perhaps from this that the erroneous idea prevails. Tusks offer convenient terms of comparison: those of an average mammoth are from eight to ten feet in length; those of the famous St. Petersburg specimen and those of the huge specimen in Chicago, measuring respectively nine feet three inches and nine feet eight inches. The largest tusks actually measured were found in Alaska, measuring twelve feet ten inches.

For the external appearance of the animal we are indebted principally to the noted specimen found in 1799 near Lena, embedded in the ice, where it had been reposing, according to geologists, for 10,000 years. Enough of the beast was preserved to show exactly what the covering of the ancient animal was, and that it was fitted out to exist in cold climates and live on the birch and hemlock.

Birthplace Unknown.

Like the birthplace of great characters, the natal place of the mammoth is not known. But the earliest known resting-place of the animal is in the Cromer Forests beds of England, which country was inhabited by him when the German Ocea was dry land and Great Britain was par of a peninsula. His remains are foun there to-day, while thousands of mammoth teeth, together with soles and turbo are found by fishermen in the North Sea If it may be taken as truth as a result c researches that the animal originated i western Europe and not in that grea graveyard of fossil elephants, norther India, the theory is that the mammot went eastward spreading himself all ove Europe, north of the Pyrenees and Alps He did not go to Scandinavia, however, a the glaciers of that country offered n temptations. All along his route he ha left us his bones to marvel at for years t come.

How the great animal became extinc when it appears he was so well equippe to protect himself against fellow animals has never been ascertained. It may b safely said, however, that long ages ag he disappeared off the earth. From flint and inscriptions found on tablets it i conclusively proved that man existe contemporary with the mammoth, bu beyond that nothing direct can be obtained.



CONSTITUTIONAL LAW.

When and How Often Congress Shall Meet—Powers of the States—Divisions of Government—President's Duties.

THE Congress of the United States must meet at least once every year, and that meeting shall be on the first Monday in December. The Constitution guarantees every man the right of religion and freedom of speech and the press; it also allows the people peaceably to assemble and to petition the government for redress of wrongs. It guarantees to every citizen a speedy trial by jury, and forbids excessive bail or cruel punishment. No person can be held to answer for a capital or otherwise infamous crime unless upon indictment by a grand jury, and no person can be twice put in jeopardy of life or limb for the same offense.

In all criminal prosecutions the Constitution guarantees the accused the right to be confronted with the witnesses against him, and also the right to have compulsory process for obtaining witnesses in his favor, and to have counsel for his defense. While the XIIIth amendment to the Constitution declares that no slavery or involuntary servitude shall exist except for the punishment of crime, and while the XIVth makes all persons born or naturalized in the United States citizens thereof, and the XVth prohibits any State from abridging the right of vote because of race, color, or previous condition of servitude, yet it does not and cannot secure to the negro the right to vote, or any other person for that matter, for this right lies with the States alone, and is controlled entirely by them.

One State cannot undo the acts of another, yet each State must respect the laws and legal decisions of another. Congress may admit as many new States to the Union as may be desired. A State cannot exercise a power which is vested in Congress alone, and, in general, Congress does not exercise powers not specially vested in it by the Constitution. Yet such can be done under the provision which says that Congress can make all laws necessary to carry out the meaning of the Constitution.

Congress cannot pass a law to punish a crime already committed. When a State law conflicts with a law made by Congress under the direction of the Constitution, the State law is void; as, for instance, when Congress passes a bankruptcy law it annuls all State laws on that subject. The government of the United States is divided into three departments, the legislative, the executive, and the judicial. The former is composed of the two houses of Congress, the House of Representatives and the Senate. In these two bodies is vested the law-making power of the government. The head of the executive department is the President, who is commander-in-chief of the army and navy, and whose duty it is to see that the laws of Congress are faithfully carried out. The judicial department is made up of the different federal district and circuit courts, and is headed by the Supreme Court, which is the last court of tribunal.

The President has the right to veto all bills presented in Congress, and Congress may not pass such bills over his veto unless by a two-thirds vote. The President has the right of pardon, except in cases of impeachment.

IN GOD WE TRUST.
JOHN JAY.
JOHN RUTLEDGE.
OLIVER ELLSWORTH.
JOHN MARSHALL.
ROGER BROOK TANEY.
E PLURIBUS UNUM
CONSTITUTION OF THE UNITED STATES
SALMON PORTLAND CHASE.
MORRISON R. WAITE.
MELVILLE W. FULLER.
THE CHIEF JUSTICES OF THE UNITED STATES.

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United States senators are chosen by joint ballots of the legislatures of the States. The representatives are chosen from districts in their respective States by popular vote. Bills for revenue can originate only in the House of Representatives. Treaties made with foreign powers by the President or his secretary must be approved by the Senate. In the Senate every State has two senators, and the smallest State has the same rights as the largest. Congress cannot lay any disabilities on the children of a person convicted of crime or misdemeanor for that cause. Territories each send one delegate to Congress, who has the right of debate, but not the right to vote.

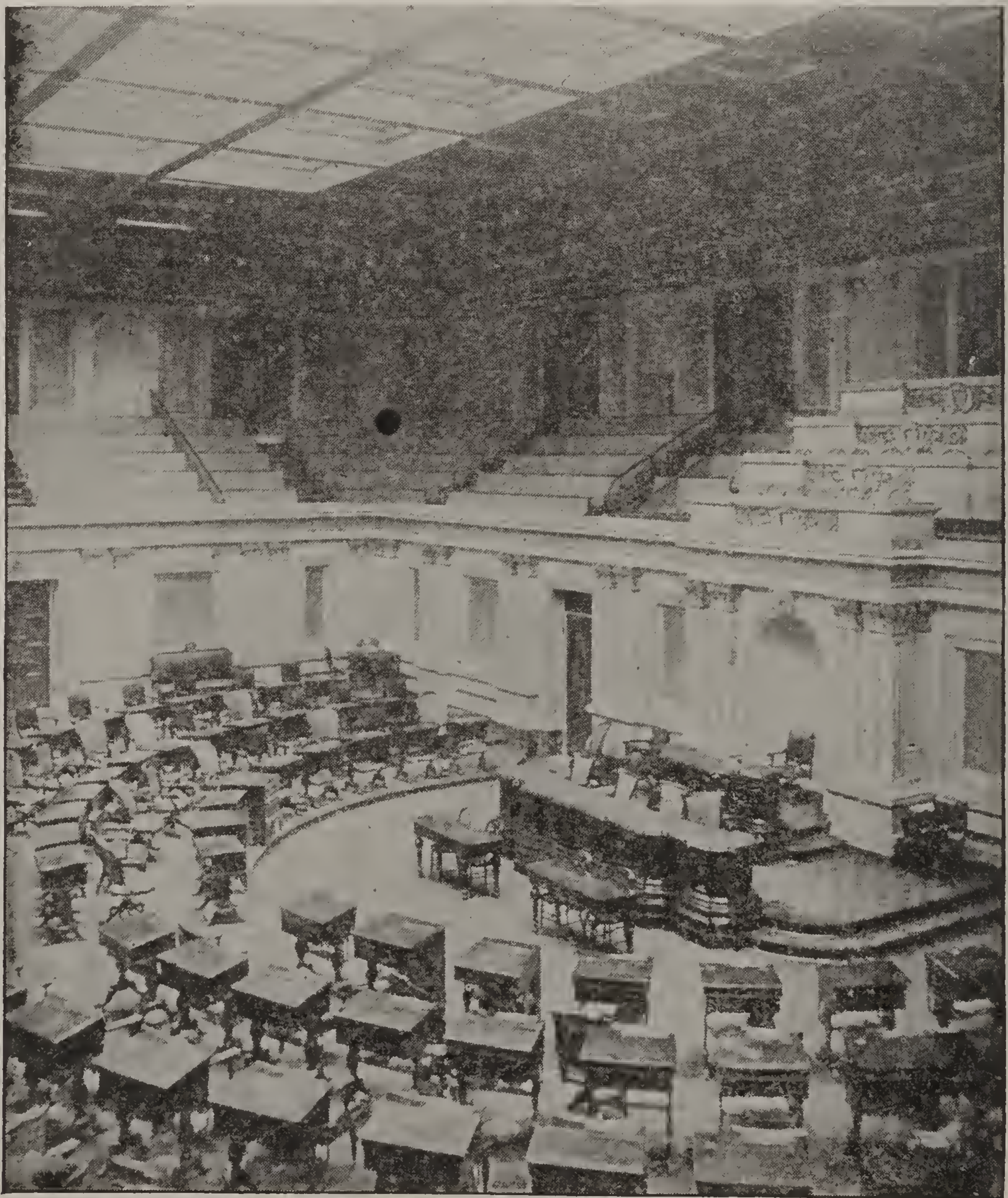
SENATOR A. J. BEVERIDGE.

What Treason Is.

Treason against the United States consists only in levying war against them or in adhering to their enemies, giving them aid and comfort, and must be proved by two witnesses to some open act, or else by confession in open court. The Vice-President, who is ex-officio president of the Senate, has no vote in that body except on a tie ballot. An officer of the government cannot accept honors from a foreign power without the permission of Congress. The House of Representatives has the sole power of impeachment, and the Senate has the sole power to try such impeachments. No person can be convicted without a two-thirds vote of the members present. A person committing a crime in one State cannot find refuge in another. The grand jury is a secret tribunal, and may hear only one side of a case. It simply decides whether there is good reason for holding a trial. It consists of twenty-three men, any twelve of whom may indict. To convict, the unanimous vote of a petty or trial jury is required.

If the President holds a bill longer than ten days for consideration it becomes a law without his signature. Silver coin in denominations less than one dollar is not legal tender for more than five dollars. Copper and nickel are not legal tender. Money lost in the mails cannot be recovered. To register a letter does not insure it. Congressmen serve two years each term, and may be re-elected. They must be twenty-five years old.

Senators serve six years, and may be returned by the legislatures as often as is seen fit. They must be thirty years old. The President serves four years, and may be re-elected, though no President has served more than two terms. He must be thirty-five years of age. The same qualifications hold good for Vice-President. A naturalized citizen cannot become President or Vice-President, but a male child born of American parents abroad is considered a native born American, and has the full rights of citizenship, including that to become President. Amendments to the Constitution require a two-thirds vote of each house of Congress, and must be ratified by at least three-fourths the States, either by their legislatures or special conventions called for the purpose. When the federal government calls out the State militia they pass out of the control of the State and under the command of the President.



UNITED STATES SENATE, WASHINGTON, D. C.

TAXATION.

Purposes of Taxation—Manner of Assessment and Collection—Property Exempt from Taxation—Single Tax and its Benefits.

IN order to carry out this great government properly, money to the extent of hundreds of millions of dollars is annually required. The average cost maintenance of public institutions is bout ten dollars a person. To secure is sum taxes are levied upon the popu-tions in many different ways, but all to e purpose. In the smaller towns and untry districts, where improvements nsist mainly in corduroy roads and e little red school house, the tax is uch lower than in the great city where rge and beautiful parks, boulevards and ublic squares, charitable hospitals, free lleges, libraries, and other institutions the sort, are run at the expense of the tate or city. In the large cities the tax ch year often exceeds $40 for an ordi-ary twenty-five foot building lot and ame house.

The manner of assessing these taxes d collecting them is very intricate to e person not informed. In every town ere is a collector and a treasurer. hese are also assessors who determine nearly as possible the just value of all e property, and upon what people ould pay taxes. Each locality has cer-in special taxes, possibly to support a hool, poorhouse and the like. Then the unty has additional taxes for certain ublic institutions, roads, bridges, etc. Added to these are the general expenses of the State officers and institutions, and lastly, though possibly most important, the general or federal government expenses. Generally the assessors ascertain what property should be taxed, then a State board determines the general needs throughout the State, and equalizes the per cent of tax to be levied, after which the different taxing bodies, such as towns, cities, counties, park commissions, school boards, and the like, lay the tax accordingly. The county clerk makes out bills for the tax and sends them out to the property owners. If the returns are slow the collectors get after the owners and finally turn the money over to the county treasurers, who in turn remit it to the different taxing bodies. Such taxation is what is called a direct tax, and is levied on both real estate and personal property.

Double Taxation.

It often happens that a person or company is doubly taxed, and lawfully. A great amount of the wealth of the country is represented by stocks, bonds, mortgages and similar paper. These represent money invested in some concern which generally has in turn invested it in tangible property. For instance, railroad bonds represent money invested in a railroad company, and indicate part ownership in all the property of the road. This tangible property of the road can be and is easily taxed. It happens that many rich people have investments of wealth in no other form than such stocks and bonds, and it would be unfair not to make them pay their share of the taxation of the country. Accordingly, a tax is laid on this form of wealth. Since the tangible property has already been taxed and the stockholder has to stand his share of the expenses out of the decreased dividends, he thus pays a double tax.

The purpose of the law is that each inhabitant who receives the benefits of the country's government should stand his share of their expenses. But when every one agrees that for the benefit of all certain things should not be taxed it is no more than fair that such should be done. Thus, for the public good all school land, fire departments, government property in general, hospitals, colleges, churches, etc., not operated for a public gain, are exempt from taxation. When, however, some institution, such as a large college, invests in property and rents it for gain, it is generally considered that a tax should be paid. Such is the case in general, though in some States charters are given such institutions that exempt them perpetually on the ground that the money thus saved would be put to educational purposes.

Besides such methods of taxation, and which are generally employed to cover the expenses of the State, county and town, there must be some method for raising funds for the general government of the United States. This is done in several ways, of which the indirect method of tariff or customs duties is the principal. This consists in laying on importations of commodities from foreign countries a certain per cent tax, either on the bulk or according to value of the article, before it can be sold in tl country. The principal reason for tl tax by the federal government is that it the most easily raised; that is, very lit can escape taxation, and it causes lit complaint because it is laid in such indirect manner that very few realize th are paying it.

Protective Tariff.

At every sea-port a custom-house located where the proper officials exami all incoming goods and levy the custor duty upon it, which must be paid befo the goods can be removed. It wou seem at first that this is a great hardsh on the importer, but it is only temporar for he in turn adds the tax to the sellin price, and in the end the consumer real pays it. From this tariff on imports h sprung the political doctrine of tariff f protection of American industries. An infant industry in this country that is tr ing to compete with older establishmen in Europe many times find it hard to cop with the lower prices of the old-wor commodities. If, therefore, the pr moters of such industries can get Con gress to place a tax so high that it almost prohibitive against these import tions, the American plants may reap good harvest.

Two things stand against carrying th policy to the extreme; one is that th people at large wish to get goods at as lo prices as possible, and were these tarif left off the foreign goods could be sold a great saving to the common peopl The other reason is that protective tari to be protective to the infant industr must be so high that it keeps out the for eign product altogether, and thus fru trates the very idea for which it wa made, that of securing revenue for th government, for if the tax is so high tha it keeps the goods out no tax can b levied. There is, however, another side to the question, and which has the support of many,—that is, that the people at large would rather see American industries active and helping the laboring man to earn a livelihood than to be able to secure certain commodities at lower prices.

Besides the customs tax the federal government levies an internal revenue, such as on tobacco, liquors and at times certain general business transactions. The revenue levied on tobacco and liquors s made against the manufacturer, and is generally in the form of a stamp tax which he pays first and then, by adding he expense to the price of his goods, col-ects later from the consumer. In time of war taxes are levied on almost every onceivable article of consumption and business transactions. At the breaking out of the Spanish American war Congress passed a war tax, which in general alled for stamp taxes on nearly every general business transaction. Among thers were the stamps required on bank hecks, promissory notes, board of trade transactions, insurance policies, deeds of transfer, telegrams, express receipts, and n nearly every bottle or package of pro-rietary medicine.

Single Tax.

Other forms of raising taxes in certain ocalities are by licenses to conduct cer-ain business, as saloons, peddlers' wag-ns, pawnbrokers' shops, etc., and the ederal government raises additional rev-nue by patent fees, postal receipts, sales f public lands, etc. In many cities cer-ain industries are carried on by the gov-rnment, and the expense is met by the eople. Such, for instance, are gas and ater plants, and in some countries the ilroad and water carriage monopolies.

A plan to do away with the multiform ethods of taxation and substitute for all a single or land tax was formulated by Mr. Henry George, a clever political economist, in his book, "Progress and Poverty," in 1879, and has since so gained in popularity that one country, New Zealand, has it in operation. In the United States, England, Germany and many other countries the idea has been adopted in theory, but the day has not yet come when governments think it possible to make such radical changes as the plan suggests. Single tax men start with the fundamental principle that all men are equally entitled to the benefits of nature, among others air, water and land. They hold that inasmuch as the Creator freely gave these to man without partiality every man should have an equal opportunity to derive the benefits therefrom.

Principal of these gifts of nature is that of land. Without it no one can exist, therefore no man or set of men should hold tracts of land for their own use, and thus exclude others from its benefits, unless they pay for such exclusive use. Land is the only thing which mankind could not do without. It is needed by every one in nearly equal degrees; therefore, upon land values Mr. George and his followers would place the only tax. They hold that great land-holders are keeping large tracts of land lying idle when millions of people have not the opportunity to use Nature's gift that would make them free and independent. Consequently some one power should see that the free gift of the Creator should not be monopolized, and to the general government they assign this task.

What Should Be Taxed.

The government is to own all lands, all highways, waters, roads and the necessary accompaniments of land, such as railroads, etc. Not all land would be taxed, but only such as is valuable enough for some one to wish to use it. It is held that land becomes valuable not from what one person does to improve it, but according to what all society does. Thus a piece of land hundreds of miles from civilization is not generally regarded as of much value. When a town springs up around it and streets are laid out and business is active, that land becomes valuable, not only to the person that was using it, but to every one in the community, for it helps toward making the other land of like value. This value is what is proposed to be taxed.

All other forms of taxation are to be discarded, and no property is to be owned outright by any body but the government. This, it is said by the large land owner, is as bad as the emancipation of the slaves was to the slave holder. Where syndicates have bought up great tracts of idle land and are allowing it to remain idle until civilization and society shall approach and make it of value, and then sell it at a gain, there would be a possible loss. For as long as there is an inch of ground that some one else desires for cultivation, a tax will be put on it accordingly. The landholder could not allow this land to lie idle and still pay a tax, so he would either have to relinquish it or be taxed.

Further than this, since no man could own the land entirely, if any other person came along and saw a piece of ground that just suited his purposes and it was in use he could secure it by paying enough for it. For instance, there is a good farm under cultivation and some farmer thinks it is worth more than the taxes indicate; he will simply ask the government to allowed to have it, and will state what t he thinks it is worth,—similar in fact real estate purchases to-day. The go ernment raises the tax accordingly, a the holder will have to stand the increas tax or sell out his holding rights to t other man. This sale is necessary, f the holder has very likely improved t property by placing buildings, etc., up it, and the promoters of the plan do n suggest confiscation of the improv ments. What single tax really is is litt more than a government rent instead of landlord rent. Such a system would:

1. Simplify the government by dispen ing with all taxing bodies, town and oth collectors, assessors, etc.

2. Establish absolute free trade with a the world, the same as now exists betwee the several States of the Union.

3. Take the burden of taxation fro the heavily-taxed farming districts, whe land is not of great value apart for t improvements,—and part of the plan not to tax the improvements.

4. Put the tax on highly valuable cit lots.

5. Make men pay for public institutio in the proportion that they monopoli the benefits of nature, and make the pay as much for holding land idle as f using it.

6. Make it unprofitable for speculato to hold land unused, enable laborers have the use of unlimited fields for cult vation of farms, mines, etc., solve th labor problem, raise wages, let every on be employed, and abolish involuntar poverty.

INTERNATIONAL LAW.

Origin of International Law—Influence of Christianity—International Conventions and What they Accomplish—Mediation and Arbitration.

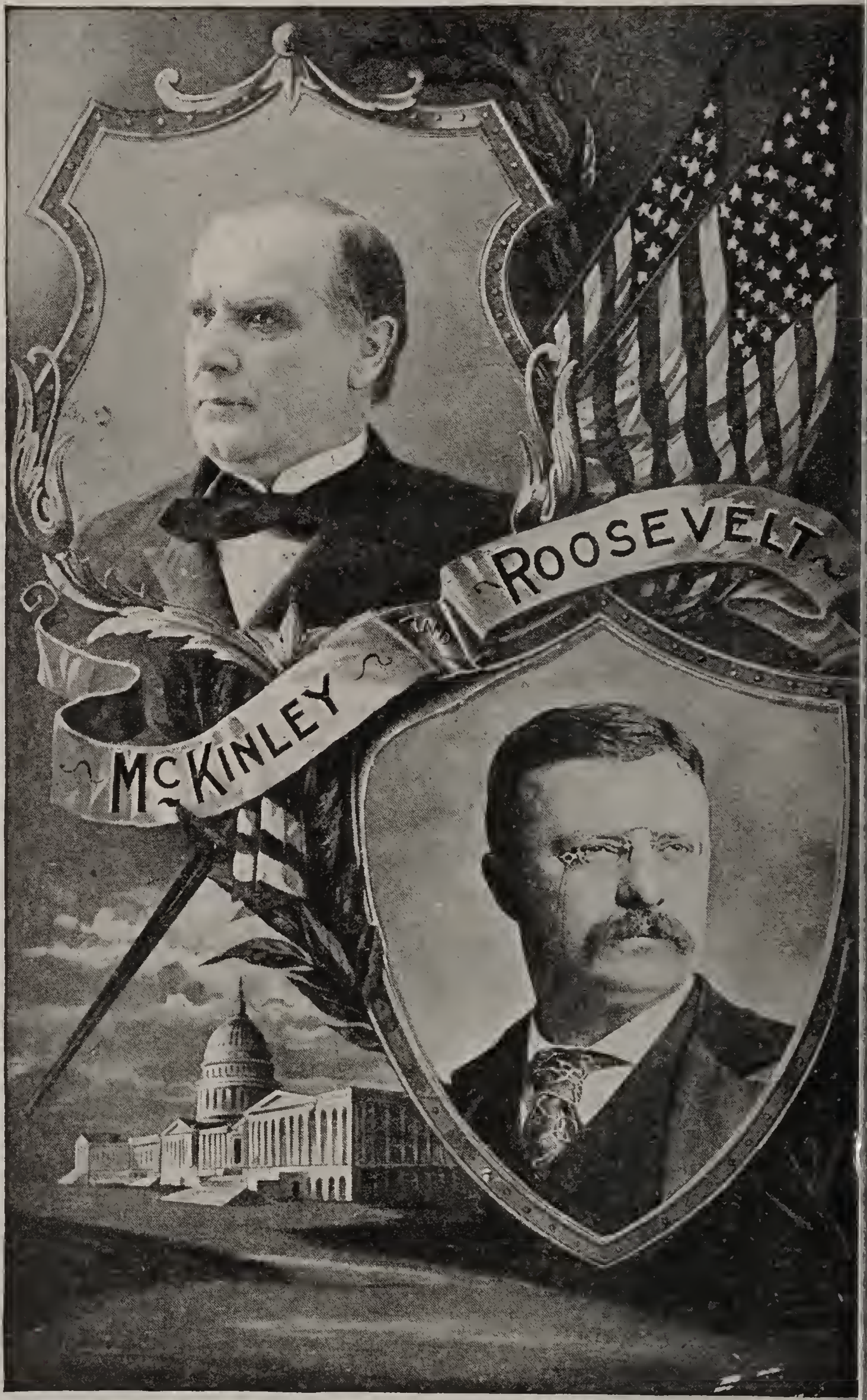
WHEN nations first began to evolve from wandering bands of nomadic savages the main idea with each king was to subdue his neighbor. Thus warfare and barbarism were rampant for nturies. With the growth of civiliza- n, however, nations, as well as indi- luals, began to see that it would be better to get along in peace and harmony with each other. Consequently alliances and treaties were entered into between many states which afterwards led to great republics and empires. The Grecian states came together and united themselves against the Persians, who had before that joined with the Medes. Countries found that they could get along with each other if they agreed to grant each other certain privileges. In this way as well as by conquest the great Roman empire was built up. Then Christianity stepped in as a still greater factor, and people hesitated to subdue or butcher each other because of the simple teachings of the Man of Galilee.

THE WHITE HOUSE, WASHINGTON.

In these first simple agreements between nations we see the beginnings of the great and complex system of the international law of to-day. When one says law he generally means a rule or order set down for following by some power that can enforce its mandates. In this respect there is hardly what one can call international "law," for the dearest thing to a government is its sovereignty and no country will allow itself to be governed by any other; thus there is really no power to enforce this so-called law. But nations are to-day so united with each other through their interests of trade and commerce, and through their interchange of citizens, that there must be rules laid down for each to follow. First to understand is that these rules, while they partake of nearly all the phases of supremely ordained law, are yet self-imposed; no nation is bound by any power on earth to agree to something against its will, unless it is so weak that it cannot defend itself against its oppressors.

The Flag of Truce.

This branch of law springs up from many sources, among others are common custom that has been laid down by years of usage, agreements between nations themselves, as by treaties, protocols, etc., and by conventions of a number of nations called together for the purpose of considering some particular rule for the government of all. As an example of the first custom it can easily be seen that when Christianity was adopted by all the European countries anything that was particularly abhorrent to its teachings would be warred against in common. Gradually the armies and navies of the world came to see th certain practices were bad for all cou tries. Thus the flag of truce, whi enables enemies to pass each other i



mune from danger, was found to be ben ficial to all sides.

Certain murderous practices of tre ments of prisoners were found to be bad for one side as the other, and we olished. Now one never hears of pris- ers being subjected to very harsh eatment. Besides these customs ac- ired by usage and supported by most tions, there are numerous laws upheld all that are for the good of all man- nd, such as, "Pirates are the common emies of mankind, and shall be pun- hed by death." Thus a pirate ship fly- g a flag of a country would be captured d punished as readily by that country another. And any small country, such the former Barbary States, that form- ly upheld these craft in the war upon mmerce, would be punished by one or of the civilized countries.

Treaties that form a part of interna- nal law do so only to that degree that ey are accepted by both or all the untries that are signers of the agree- ent. Thus two countries may agree if ey so wish that certain malefactors, as urderers or forgers, shall be delivered the other country for trial simply upon quest. This is binding between the o countries, but upon no others. This ay be the case in other things, as tariffs, plomatic services, general commerce, otection, etc. Now, in respect to these eaties, the signatory powers are bound honor to uphold them till their expira- n or revocation by both countries, upon nalty of war if the countries offended e fit to begin it. The treaty is always a rt of the highest law of a land, and if at country does not protect the other untry by upholding that law, it shows a each of friendly feelings, and may stify war to protect the injured coun- 's rights.

International Conventions.

Besides the treaties, we have spoken of nventions of a number of countries. ese are called together upon certain casions, and each state is generally represented by men empowered to draft laws suitable to that particular state. Topics are discussed at these meetings, and generally a treaty of all powers present is drawn up prohibiting certain things in war or peace, which, when the treaty is properly ratified by the governments of the countries, becomes absolute law, and all the countries party thereto are bound in honor by it, and may only break it under the liability of severe punishment by the other states. Some of the laws framed at such conventions are that the flag of truce and the hospital flag shall not be fired upon in war; that neutral countries shall not be molested in their shipping by countries at war; that privateering be abolished; that blockades to be binding must be effective, and maintained by a force sufficient to prevent access to the enemy's coast, and that certain murderous bullets shall not be permitted in war. The honor of all the nations concerned upholds these laws very strictly, and when it comes to their violation by a private individual the state generally punishes the offender as severely as though he had violated a municipal law, for, remember, the international law where accepted by the country is as much a part of its other laws as though enacted by its legislative body solely.

In order to carry out the dictates of international law there must, of course, be tribunals for rulings and agents to look after a country's interests abroad. For this purpose courts are provided by the different countries, such as the United States District and Supreme courts, and the High Court of Admiralty of England. These tribunals decide conflicts between municipal and international laws, and carry out their decisions. Each country is represented abroad by ambassadors, ministers, attachés and consuls. An ambassador or minister is an official appointed by the chief executive, generally with the approval of a legislative body, and looks after the interests of his sovereign, of whom he is directly the representative. For that reason he is held inviolate in the case of war, and is allowed by courtesy to leave the country to which he is accredited and return to his own.

These officials are intrusted with such great topics for discussion with the visited country as the making of treaties, etc. The consul is the commercial agent of his country. It is his duty to report to his sovereign the state of commerce in the country he is visiting. He also looks after the passports of his fellow countrymen traveling abroad, and protects them from the encroachments of harsh laws to which they might by chance be subjected. Ministers and ambassadors also assume many of the duties of consuls, though the main distinction is that the former are the direct representatives of a country to the court of the accredited country, and only one minister or ambassador is sent to one country; while consuls are merely commercial agents, and are sent to nearly every town in which the country has subjects or does any business. Attachés and secretaries of legations are minor officials at the residence of the ministers, and serve in their absence.

The Nations and Arbitration.

Outside of the great duties of the diplomatic corps of carrying on negotiations regarding trade and peaceful negotiations, perhaps the most noteworthy occupation is that relative to war and its following treaties of peace. Countries are very jealous of their sovereign rights, which allow no one to dictate to them what they shall do. If, therefore, they become embroiled in difficulty with another country the last thing they desire is for a third nation to step in and try to settle the fight for them. Civilizati however, dictates that countries shall charitable and offer their good services ameliorate the troubles. This takes s eral forms, such as arbitration, mediati and intervention. The most comm method of settling disputes aside fr actual conflict is that of arbitration. T countries disputing generally sugg themselves that a third nation or natio appoint commissioners who, togeth with representatives appointed by the d putants, shall argue the matter and fina accept the majority vote of all for a fir decision.

Some of the greatest disputes have be settled in this manner. It also frequent happens that a strong and powerful cou try sees the folly of allowing a struggle go on between nations where it might amicably settled, and offers her go services toward a peaceful solution of t difficulty. This is called mediation, a is generally appreciated as an act of kin ness, even if the disputants do not acce the offer. The third form, or interve tion, generally comes in the shape armed forces and the order that a count shall cease its molestations upon pain war with the interfering nation. Su was the case in the late struggle betwe Spain and Cuba, and which by the inte vention of the United States brought our war with Spain. This latter meth of settling disputes is viewed askance most nations, and is a dangerous polic

Since the great peace convention The Hague in 1899, a number of inte national laws have been adopted by t family of nations. The Czar of Russ called the conference with the purpose solving the question of universal peac The meeting resolved itself, howeve into an international convention of inte national law, and the body of resolutio adopted by it and afterwards ratified ne legislative bodies of the different ountries constitute the new laws. One f them calls for a permanent board of rbitration for the settlement of all disputes between the signers. Any nation may in the future feel perfectly warranted to step in and ask that this board settle a dispute that some other nations are having. This solution is the one nearest perfection that has ever been reached.

INTER-STATE COMMERCE LAW.

Board of Inquiry—What It Does—How Rebates Are Given—Other Methods of Eluding the Law.

BY the power vested in Congress by the clause in the eighth section of Article I of the Constitution, which empowers it to regulate commerce mong the several States, that body saw t, in 1887, to pass the present act which controls and regulates that commerce. The law applies to all carriers of public nature engaged in the trasportation of passengers or property by rail or water, or by both, from one State, Territory or district of the United States into any other State, Territory or district. By State sovereignty over its own territory and jurisdiction any one of the States, of course, can regulate its internal commerce without the interference of the federal government, but so soon as the commerce takes on an inter-state aspect by transit into other States or Territories, the federal government is empowered by the Constitution to regulate it.

The law provides for a board of five commissioners, empowered to inquire into the management of transportation companies and the reasonableness of their charges. Among other

THE GREAT ST. LOUIS BRIDGE OVER THE MISSISSIPPI RIVER.

Connecting the city and East St. Louis. All railroad trains entering the y must cross this bridge and every passenger pay a toll of twenty-five nts. The bridge is owned by a private corporation.

things, the act requires that all rates shall be just and reasonable, and that charges for a short haul shall not be more in proportion than for a longer haul on the same line and in the same direction when the circumstances and conditions are similar. This clause in the law was particularly intended to work against the discrimination by the railroad companies in favor of large shippers, who were getting lower rates in proportion than the smaller shippers, and thus could control the market in a number of commodities.

As it is now, any rebates for such cause are illegal, though in fact nearly all the great meat, grain, harvesting machinery, oil, coal and other dealers in similar goods have secret arrangements whereby the law is subverted and the rebates received from the transportation companies. This evil was fought for years before the inter-state commerce law was enacted, but with little effect. By clever pooling of the different railroads, a big grain shipper can send his freight from the Dakota grain fields clear to New York more cheaply than can the smaller fry from Ohio. This gives the Dakotan a chance to shade the market by a good fraction of a cent, and thus to get rid of his supply, when the other farmer must either charge more and stand the chance of slower sales, or else meet the figure of the Dakotan and not make so large a profit.

Another manner for eluding the law and for gaining more business for both the road and the dealer is in the harvesting machinery business. In order t retain the large freight shipments of harvesting machinery houses, railroads sometimes grant, contrary to law, a rebate o 25 per cent to the shippers. This big saving in expense to the manufacturers o course influences them to turn all their business over to that road, and while a gain for the road, is a greater gain to them, as it enables them to place their machines in the field at such greatly reduced rates that they can easily outbid their competitors.

MISSISSIPPI RIVER STEAMBOAT.
At her landing, preparing to take on freight. These steamers are smaller than either lake or ocean vessels.

All these violations of the law were foreseen and stipulated against in the law, such as by the enactment that there shall be no discrimination between persons or classes of traffic or localities. The law also calls for public printing of the rates charged, and that the books of the companies shall be open annually for inspection by the commission. Exceptions are made in the act for the carriage of the property of the United States or municipal governments, charitable institutions or to and from fairs and expositions, and it allows the issuing of mileage, excursion and commutation tickets, and permits the issuing of reduced rates of transportation to ministers of religion, and free tickets to officers of the carrier or other carriers.

TEST CAR OF THE UNIVERSITY OF ILLINOIS.

What the Car Is to Accomplish—How It Is Equipped—Its Dimensions—Apparatus Used.

THE University of Illinois and the Illinois Central Railroad have joined hands in an unique undertaking that promises to revolutionize some parts of university work and to bring practical knowledge of railroad work home to students with new force. The university and the railroad have completed a test car. The car is designed, in the language of Prof. Edward C. Schmidt, of the university, for general railroad experimental work, and is adapted for the following purposes:

Measurement of train resistance.
Autographic track inspection.
Locomotive road tests.
Air-brake tests.
Station tests.

The car is owned and operated jointly by the Illinois Central and the railroad mechanical engineering department of the university. The car was built by the road, and the apparatus and other equipment by the university. Hydraulic transmission of the pressure and motion has been adopted for both the apparatus for dynamometric work and for track inspection. The three men responsible for the car and its equipment are William Renshaw, superintendent of machinery of the Illinois Central; Prof. L. P. Breckenridge, and Prof. Edward C. Schmidt of the University.

In building the car care was taken to give it extraordinary weight, in order that it might withstand the usage it will receive in the heaviest freight service. It is 45 feet 4 inches long and 40 feet over the end sills. The inside width is 8 feet 4⅜ inches, the outside width 9 feet 1⅝ inches, and an extreme width over the observation windows of 10½ feet.

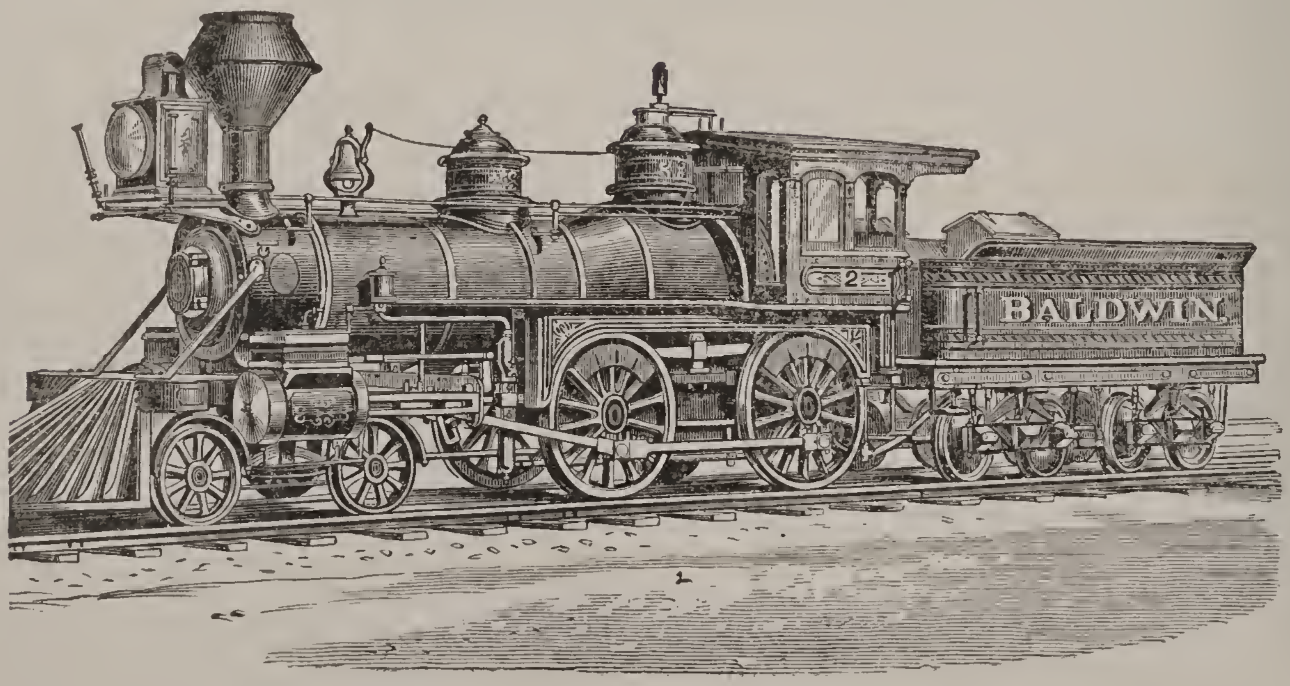
Division of Space.

The space given up to berths, lockers and toilet rooms for the use of the students and professors is about fifteen feet. The working space for the tables and instruments is a little over forty feet. On the rear of the car a lookout is provided, from which the handling of the train may be observed. In this lookout are signal push buttons and pens for the dynamometer record of location of mile posts, stations, curves and grades. At the front end are projecting windows, from which the train and engine may be watched.

The apparatus for the measurement of train resistance is practically completed. So fine is this apparatus that the pressure due to the pull on the drawbar is taken in a cylinder filled with oil, and this oil transmits this pressure to the recording and indicating gauges. It is provided that the record of the amount of drawbar pull shall be made on a continuous strip of paper. This paper is driven from the car axle. Upon it are marked, in addition to the curve showing the pull on the drawbar, the location of mile posts and stations, and also the time. The mile post pen is controlled by electro-magnets. It is drawn slightly aside at stations and mile posts by the magnet when the observer in the lookout touches a button. The pen which records the time is automatically controlled by a clock, which makes electric contacts every five or ten seconds, as may be desired. A speed recorder is also provided for. The oil pump receives its supply from an oil tank, and by arranged piping forces it into the three cylinders of the dynamometer. Oil is cleared from the cylinders by the use of compressed air.

It has been arranged that the working pressure of the oil in the cylinders shall be from 300 to 1,000 pounds per square inch, and for this range of pressures the first, or largest, cylinder has sufficient capacity for the heaviest freight service. The intermediate cylinder will be used on a train of ordinary tonnage and the smallest cylinder in passenger service. To the table upon which are the dynamometer recording gauge, the rolls for driving the paper chart and the Boyer speed gauge, has been attached a vertical shaft, which derives its motion from the car axle by means of spiral and bevel gears.

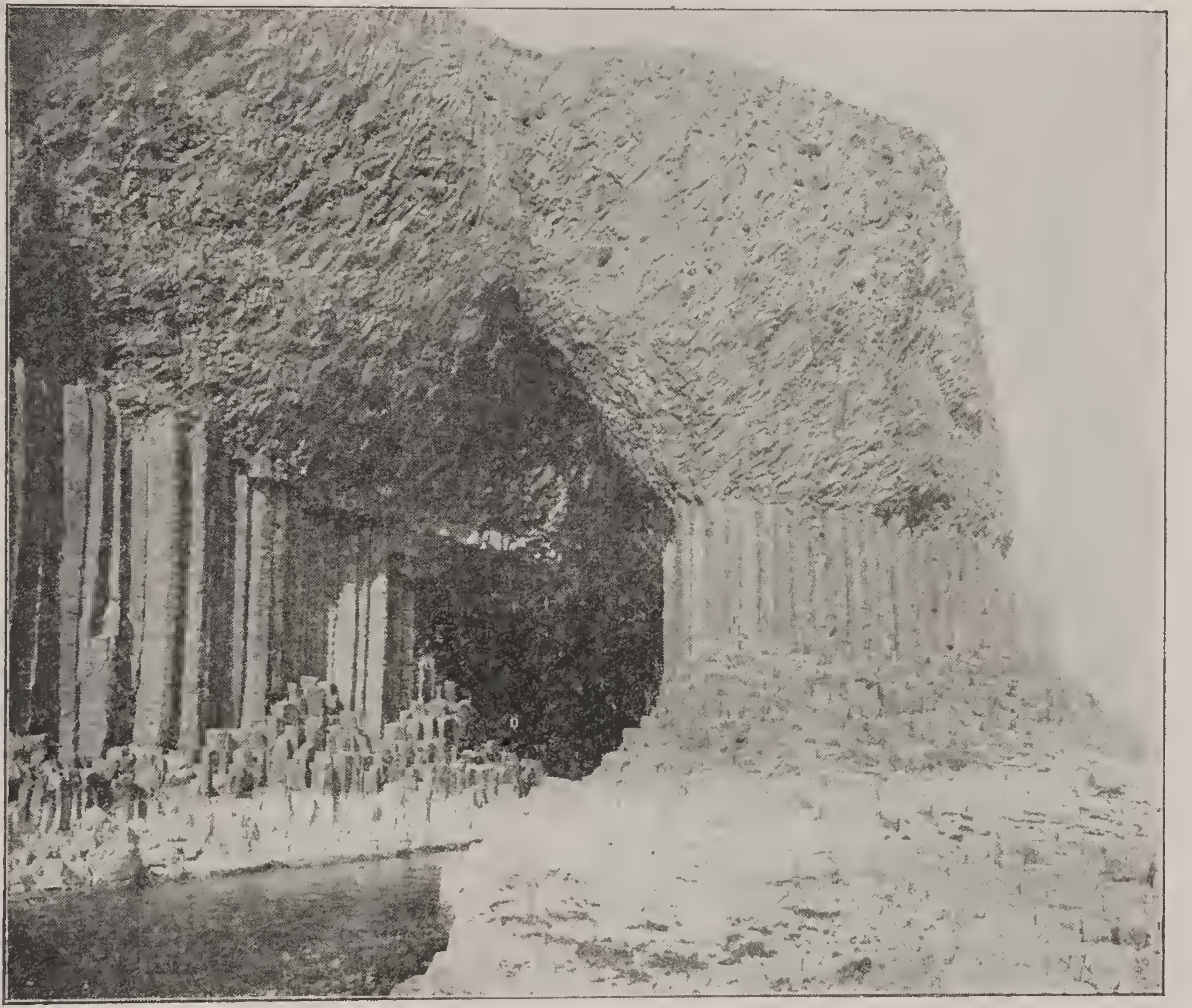
In addition to this apparatus the car is equipped for locomotive road tests with gauges for indicating and recording boiler pressure and steam-chest pressure, duplex air gauge, air-brake train line pressure recording gauge, and the other apparatus used in locomotive tests.



THE GRAND CANON.

A Wonderful Freak of Nature—Located in Arizona—A Great Gorge in the Mountains Caused by Water Erosion.

THE Grand Cañon of the Colorado was discovered by the early Spanish explorers in 1540, and lies in the northern part of Arizona. At the first view of the Grand Cañon one is unimpressed by any detail; but is overwhelmed by the ensemble of the stupendous panorama, a thousand miles in extent, that lies wholly beneath the eye, as if one stood upon a mountain top instead of the level brink of a fearful chasm, whose opposite shore is thirteen miles away, and whose depths are more than six thousand feet below. A cañon, but not the accepted type; an intricate system of cañons, rather, each subordinate to the river channel in the midst, which is itself subordinate to the total effect. The spectacle is so symmetrical and so completely excludes the outside world, and its accustomed standards, that only by descending into the cañon is it possible to comprehend anything of its proportions.



FINGAL'S CAVE, SCOTLAND.

Hewn out by the ocean waves and supposed to have been occupied by Fingal, bard and ancient king.

YELLOWSTONE NATIONAL PARK.

Wonders of the Geysers—Lofty Mountain Peaks—Canons of Beauty—Mammoth Hot Springs—A Mountain Lake.

YELLOWSTONE National Park, of Wyoming, the greatest natural wonderland in the world, presents a very wide range of phenomena in its 3,000 square miles of territory. In reality, it is not a park, but rather an aggregation of parks, with lofty mountains, great lakes, crystal cascades and mighty cataracts, deep and wonderfully made cañons, translucent springs, painted cliffs, spouting geysers, mountain valleys, mud volcanoes, sulphur mountains, and thousands of deer, elk, antelope, bears, beavers, wild fowl and feathered game, and the streams full of trout.

OLD FAITHFUL.

One of the great geysers of the Yellowstone Park, spouting scalding water and steam.

The park is well provided with modern hotels, near the more prominent points of interest, among which are the Mammoth Hot Springs, with their peculiar cliffs or terraces, covering a large area on the side of Terrace Mountain, at the base of which stands Liberty Cap, an extinct geyser of strange form, while above it are Cleopatra, Minerva, Pulpit, Mount and Jupiter terraces, and higher still are Devil's Kitchen, Cupid's Cave and Angel Terrace. In Norris Geyser Basin one finds the Black Growler, the only steam geyser in the park, and one that is always roaring; furiously boiling springs of yellow, green, pearl and white water, a beautiful terrace like white marble; the Devil's Inkstand; Congress Spring and Monarch Geyser.

Then passing Elk Park, through Gibbon Cañon and the valley of the Firehole River to the Geyser basins. In Lower Geyser Basin are Fountain Geyser, Clepsydra Spring and the Wonderful Paint Pots. In the Upper Basin are the Old Faithful, Bee Hive, Castle and other famous geysers. Black Sand Pool, Cliff Spring, Sunset Lake, Emerald Pool and the Three Sisters. Yellowstone Lake is one of the highest known lakes in the world—7,741 feet above the sea level—very irregular in form, and the shores picturesque.

WEIGHT OF CATTLE.

How to Compute Weights of Cattle—Table of Factors—The Fractional Weight of Quarters and Hide.

To compute the dressed weight of cattle measure as follows in feet:

1. The girth close behind the shoulders, that is, over the crop and under the plate, immediately behind the elbow.

2. The length from a point between the neck and body, or vertically above the junction of the cervical and dorsal processes of the spine, along the back to the bone at the tail, and in a vertical line with the rump.

Then multiply the square of the girth in feet by the length, and multiply the result by factors in the following table, and the quotient will give the dressed weight of quarters:

Condition—	Heifer, Steer or Bullock.	Bull.
Half fat	3.15	3.36
Moderate fat	3.36	3.5
Prime fat	3.5	3.64
Very prime fat	3.64	3.85
Extra fat	3.78	4.06

Illustration: The girth of a prime fat bullock is 7 feet 2 inches, and length measured as above, 4 feet 5 inches.

Seven feet 2 inches equals 7.17, and 7.17 squared equals 51.4, which multiplied by 4 feet 5 inches and by 3.5 equals 794.5 pounds. Exact weight was 799 lbs.

Comparative Weights.

Quarters of a beef exceed by a little half weight of living animal. Hide weighs about eighteenth part, and tallow twelfth part of the animal.

COMPARATIVE WEIGHTS OF LIVE BEEVES AND OF BEEF.

	Lbs.	Per cent.
Bullocks	2,800	72 to 78
Heifers	2,600	70 to 76
Bullocks	2,600	
Heifers	2,400	66 to 70
Bullocks	2,400	
Heifers	2,100	64 to 68
Bullocks	2,100	
Heifers	1,800	63 to 66
Bullocks	1,550	61 to 64
Heifers	1,550	
Bullocks	1,260	58 to 61
Heifers	1,200	
Bullocks	1,050	57 to 58
Heifers	1,050	
Bullocks	980	50 to 56
Heifers	950	

THE FILIPINO IN SPORT.

How the Islanders Hunt—They Are True Sportsmen—Ducks and Snipe Are Plentiful—Cock-Fighting Indulged In.

THE Filipino is a hunter and a sportsman. He does not hunt for the purpose of profit. Although he is something of a vegetarian, he keeps his larder supplied with ducks, snipe, pheasant and deer. The serious sport is in hunting the boar, wildcat and wild water-buffalo. The Filipino's weapons consist of ancient carbines of the flint-lock type, bamboo arrows, spears and boloes.

The native is fond of carabao (wild water-buffalo) hunting. It is too hazardous to attract the Englishman. The carabao is found in the Camatines, in the center and north of Luzon, and in the vicinity of Manila. The deer consist of three varieties, two of them peculiar to the island; small and fleet-footed. The smallest is the cherrotain or mouse deer, not much larger than a house cat. Snipe, quail and wild duck inhabit the marshes and rice fields.

The national sport is cock-fighting. This amounts to almost a passion with the natives. Sunday is the favorite day for a fight, but no holiday is complete without one. Men, women and children attend these fights, and

JAPANESE WRESTLERS.

Engaged in their favorite sport, with a third acting as umpire or referee. The Japanese are experts in wrestling, being wiry and agile.

women gamble as freely as the men on every point of the bird's chances. Even the children cannot resist it. The wife and children are often neglected that these fighting cocks may receive proper attention.

The sport of the higher class of Filipinos is polo. Many of the towns have good courses. The Filipino pony is not a native of the islands, but was originally brought over from China. It is swift, stocky and handsome. It thrives on water sweetened with molasses and rice paddy. It sleeps on a stone floor and is quite frisky. The rich half-caste element indulge in fencing, the knowledge of which was brought from Madrid and Paris by General Luna.

IGORROTE RUNNERS OF THE PHILIPPINES.

Men Who Travel Far—Bearers of Burdens—Well-built Racers—Sleep at Any Time —Carry Food for Others.

THE Igorrotes of the Philippines are a race of long-distance burden-carriers and runners. They are a bundle of muscle, and their physical development is fine. The basket they use for carrying purposes is called chu-gee, and is a framework consisting of a strong back, rectangular in shape, made of split bamboo or hard-wood splints, about sixteen inches across and thirty

FRUIT GATHERERS AND MERCHANTS OF THE ISLAND OF LUZON, THE PHILIPPINES.
Their style of dress and manner of house building also shown.

CAMP OF U. S. TROOPS BOUND FOR THE PHILIPPINES.
At the Presidio, San Francisco—Awaiting orders.

inches high, which fits on the back, projecting at its upper end above the nape of the neck, while the lower end rests well down on the spine. To this framework is fastened, about a third of its way down, tied on each side, forming a single loop, a heavy carrying-band, made of dried and beaten manila hemp. It is passed over the upper point of the forehead, and ordinarily sustains most of the weight of the load. There are other bands which pass under the arm and over the shoulder, so that when the carrier's neck becomes tired he can throw the weight on the shoulders.

Narrow wings, or side flaps and a bottom piece are added to this device. These are drawn up against the load, as retaining boards. The Igorrote's training begins when he is about eight or nine years old, by following long and difficult trails until he becomes hardened. The little mountain horse so common in the Philippines is not used as a beast of burden, as it is said he could not make the difficult inland trips more than once in ten days and keep in condition, while the human beast of burden can make them day after day and keep in condition. All food and merchandise which goes into the interior of these countries is packed on the backs of these carriers and thus transported.

SAME CAMP OF U. S. TROOPS.
Three minutes after the order was given to strike tents and form for marching.

Like the Chinese, the Igorrotes can sleep anywhere, and their power of endurance is almost as great. The women rform an equal share of work with the n. They have a basket of their own, fering from that of the men in that it ound and tapering at the bottom. It carried in much the same way as the n-gee. These carriers have been very eful to the American army in the ilippines, keeping the garrisons sup- ed with food by carrying it from the st depots. And the trail followed through the mountains, up and down, is not an easy one to travel. The only garment which the Igorrotes wear is a katap or cotton shawl for the protection of their backs and heads at night. When dusk comes on they light small camp fires, boil their rice and potatoes, which they eat with their hands from the common pot. After the meal each man smokes a pipe, and his tobacco is not the best, but he is satisfied.

WHEN MOUNTAINS BLOW THEIR HEADS OFF.

eat Volcanic Eruptions—Krakatoa and Its Ruin—Streams of Lava and Water—Thousands of Lives Lost.

THERE are two kinds of eruptions to be noted in the history of volcanoes, those that build up wly and those that destroy swiftly. e eruptions that build up mountains r periodical wellings over of molten a. The others are violent explosions, urring at irregular intervals and bring- widespread destruction. It often hap- s in the case of a volcano that builds lf up, when the lava forms a hard ll and the crater crusts over at the top, n say the volcano is dead. But this is true. The fires are there at the core tent energy ready to be stirred. The se of the sudden eruption of these vol- oes is the same principal as a bursting er—the sudden and excessive genera- of steam caused by the hot part of a ano coming in contact with water. This tact may be due to the readjustment strata or materials beneath, so that a am of water is turned into the crater. he greatest explosion ever known was that of Krakatoa, August 26 and 27, 1883—a little island in the Strait of Sunda between Java and Sumatra. Krakatoa had but one peak, measuring scarcely 3,000 feet. The island was uninhabited and not touched by ships. The volcano itself was considered insignificant. For nearly two hundred years the volcano had been considered as dead, but on May 20, 1883, she began to roar and rumble. For three months this continued until the 24th of June when a second crater opened. After this a third opened. The low-lying walls of the craters gave way in many places. Then thousands of tons of water surged downward on August 26th. Explosion followed explosion until there came one more violent than all the rest. The noise was heard at St. Lucia Bay, Borneo, 1,116 miles distant; at Perth, West Australia, 1,902 miles away; at Alice Springs, South Australia, 2,233 miles distant; and at Diego Garcia, an island in the Indian Ocean, 2,267 miles distant.

Destruction Wrought

The force of the explosion disturbed the water to such an extent that lighthouses in the Strait of Sunda, towns and villages on the shores of Java and Sumatra bordering the strait, boats and vessels on the same shores, were all destroyed and nearly 37,000 thousand lives lost.

A MOUNTAIN SCENE ON THE SANTIAGO & VALPARAISO RAILWAY IN CHILE, SOUTH AMERICA.
The bridge construction is fine.

The greatest explosion of the eighteenth century was that of Asama in 1783, which has been regarded by many authorities as one of the most frightful in the history of volcanoes. Asama rises to a height of 8,000 feet, and according to records sent down a river of mud from five to ten miles broad, that overwhelmed forty-two villages. Th records continue:

"In some places the mud was so h that it did not stop boi ing for twenty-fou days. In the Tonezaw River immense masse of lava remained re hot even in the rive itself. In Kurogano stone 120 by 264 fee one among many, fel into a river and forme an island. Two river were sucked up into th mud torrent and thei places taken by dr land, and the noise o the explosion was like thousand thunders. Th lakes were poisoned the fish sickened, th rivers were full o dead dogs, deer an

BRIDGE ON THE CUSCO RAILROAD, SOUTH AMERICA.
Showing elevations in the Andes and class of bridge work.

monkeys, with hair singed from their bodies.''

Then there was old Bandaisan, in Japan. For years this innocent volcano was regarded as dead. No one knew of any eruptions, and the inhabitants nearby felt perfectly safe, but on July 15, 1888, Bandaisan, without warning and apparently without reason, blew her head off and discharged 1,600,000,000 cubic yards of rock and earth.

The Bandaisan and Krakatoa Eruptions are the most famous of modern times. The active volcanoes of the Hawaiian islands have caused considerable uneasiness. The Asiatic and American shores of the Pacific Ocean are dotted with volcanoes from Japan to the islands of the Indian Ocean, and from Patagonia to Alaska, but the most active volcanic center in the world is the Java island and its vicinity. This island, having about the area of England, contains forty-nine great volcanic cones, some of which are 12,010 feet in height. Etna has more than two hundred quite conspicuous cones within a radius of ten miles from the center of the main crater. Little was known of the volcanic forces pent up in Vesuvius prior to 79 A. D., when the great catastrophe took place, destroying Pompeii.

THE CARRIER PIGEON.

'heir Value in Peace and War—Dr. Andree Used Them—The Homing Pigeon—High Speed Attained.

DURING the last few years no phenomenon more interesting and unsolvable than the feats of the carrier or homing pigeon has presented itself. This bird as proved to be of inestimable value both in times of peace and of war. Were t not for the services of one of these aithful animals the scientific world would e without the reports of Dr. Andree's rctic explorations. In the late Philippine war the bird demonstrated its value y carrying messages for the army. In imes of peace it is utilized for carrying the esults of yacht races and other messages here access cannot be had to the telegraph.

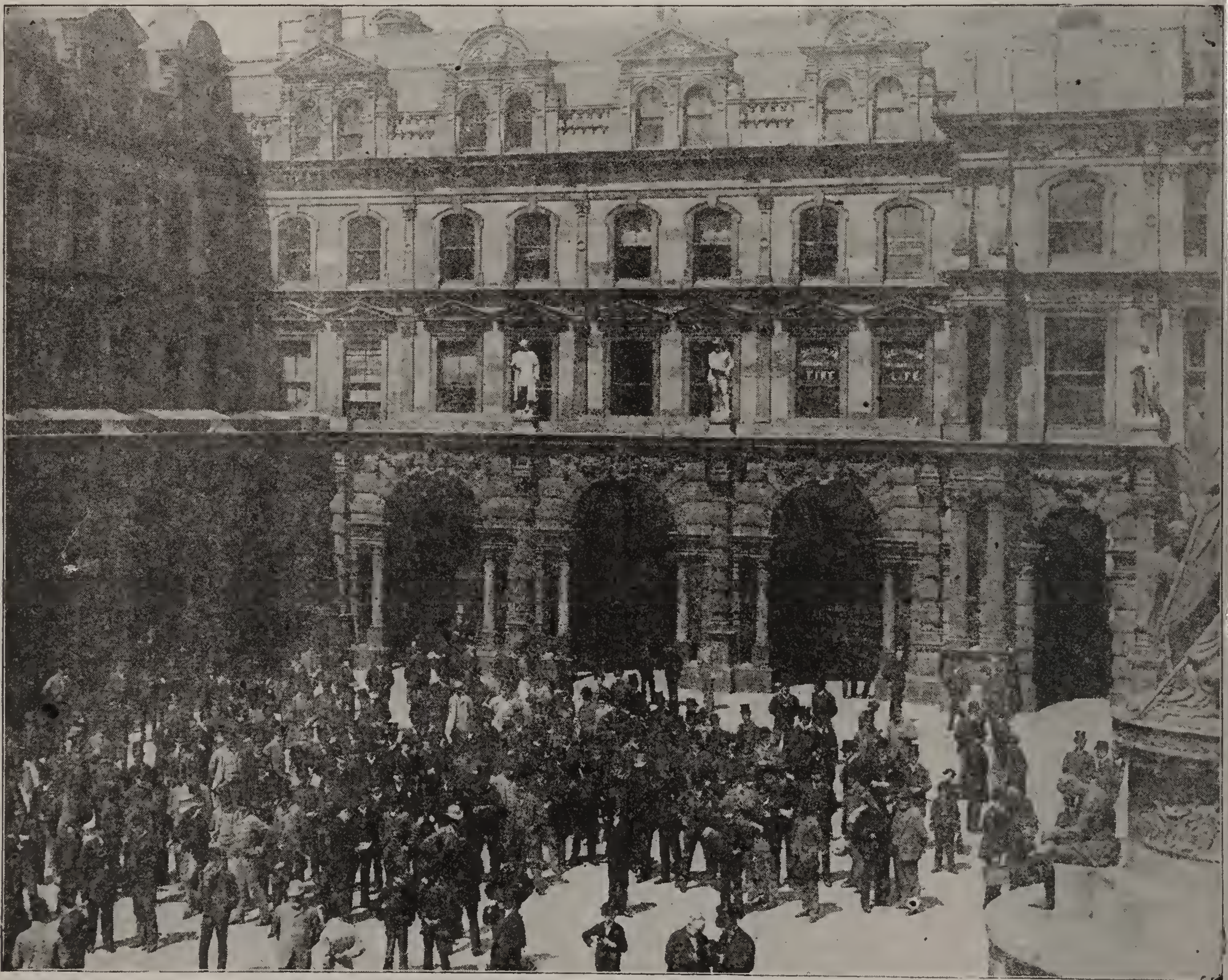
A remarkable feature in connection ith the homing pigeons, and one that is ot generally known, is the wonderful nstinct the bird has for finding its home. The general opinion is that the bird may be started with a message from any point to another given point. Such is not the case. The pigeon will return to its home and nowhere else. These birds have been taken in boxes thousands of miles and then permitted to spread their wings to the air. They soar towards the heavens for a few minutes and then dart out in a direct line for their homes.

In making these flights the speed attained by the birds is remarkable. In many instances a rate of speed has been maintained for a thousand miles which cannot be excelled by the Empire State Express itself. The breeding of these birds is now more than a sport; it is a profession. Several experts are giving their time and money to the training of these birds, and their pedigrees, like that of great race horses, may be found to extend for generations.

FOREIGN TRADE GAIN.

United States Leads All Nations—Important Statistics Collected—A Hundred Years' Growth—National Prosperity Shown.

IT is in the exportation of manufactured products that the United States is making the greatest strides, showing that we are no longer simply an agricultural nation. The exportation of manufactures alone in the nine month ending with September, 1900, amounted t $338,687,243, against $227,502,649 in th corresponding months of 1899, and $145, 793,834 in the same months of 1895



THE BOURSE, OR WALL STREET, OF LONDON.
Where the prices of the money market of the world are made and unmade every legal day of the year.

Thus the exportation of manufactures has increased nearly 25 per cent in one year, and has more than doubled in four years from 1896 to 1900, while the importation of manufacturers' materials has also increased at a very rapid rate.

Exports of manufactures of iron and steel alone amounted to $110,000,000 in round numbers, in the ten months ending with October, 1900, against $86,000,000 in the corresponding months of 1899, and $51,000,000 in the corresponding months of 1897, thus having more than doubled in the three years from 1897 to 1900.

Not only have the manufacturer and the millions dependent upon his industry shared in the prosperity, but those engaged in agriculture and mining seem to have been equally prosperous, judging from the record shown by the figures of our export commerce. The exportation of agricultural products in the ten months ending with October, 1900, is in round terms $700,000,000, as against $625,000,000 in the same months of 1899, while the products of the mine, the forest and the fisheries also show an increase in 1900 as compared with the figures of 1899.

This increase in the products of industry is especially interesting in the fact that in many cases it shows a higher reward for a given quantity of labor or in other words higher prices received for the article itself, as well as an increase in the quantity produced and sold.

LONDON BRIDGE AT THE NOON HOUR.

When it carries the greatest throng. The bridge is famous in poetry, prose and song, and crosses the river Thames.

Producers Earn More.

In cotton, for instance, the average export price per pound in the months of September and October, the beginning of the new cotton year, has been 9.9 cents against 6.7 cents in the same months of the preceding year, while in other agricultural productions and in various lines of manufactures especially those of iron and steel, and in the products of the mine there are increased prices per unit of quantity, and thus better earnings for those who produce them.

A comparison of conditions in the United States with those in other countries, as measured by the foreign commerce, indicates a degree of prosperity which compares favorably with any country of the world. Our own exports for the ten months ending with October

THE LLAMAS OF SOUTH AMERICA.

Used instead of horses to carry freight and other burdens over the mountains. They are docile.

show an increase, as has already been noted, of $166,000,000, while in the exports of the United Kingdom the increase in ten months is $125,000,000; while the 1900 figures for Belgium, France, Spain and Italy show no increase in exportations during that part of the year 1900 whose record is now available.

In the case of Belgium, France, Spain, Italy, Germany and the United Kingdom, the imports are greater than the exports, while in our own case the exports vastly exceed the imports, the excess of exports over imports in the ten months ending with October, 1900, being $499,667,936, or a greater excess than in the corresponding period of any preeding year and a greater excess than that of any other country of the world.

A most impressive showing of the growth of American commerce and of the wonderful balances in this country's favor during the last thirty years of the past century is found in an official report. Imports exceeded exports almost continuously prior to the decade 1871-80, and since that time exports have almost continuously exceeded imports, but the excess of exports over imports in the decade 1891-1900, is extremely large, as compared with any preceding decade, amounting to $2,615,343,320; while, as already shown, the excess of exports over imports in the single year 1900 will also be greater than in any preceding year in our history.

ENORMOUS GOLD PRODUCTION.

Wonderful Record of 1900—What Is Expected in Year 1901—The United States Becoming the Greatest Gold-Producing Country in the World—Foreign Nations Seek Our Gold—Important Figures on Production.

THE following compressed story of the world's work in the gold fields is told in millions of dollars:

	1899.	1900.	1901.
United States	71	82	94
Canada	21	25	30
Mexico	8½	8½	8½
Africa	73	5	75
Australia	80	38	88
Russia	22	23	33
ndia	8½	8½	9
China	5½	4	4½
All others	17	18	23
	306½	257	365

The world's production of gold for the ast decade of the present century, using he above semi-official estimate for 1900, s $2,106,195,000, as follows:

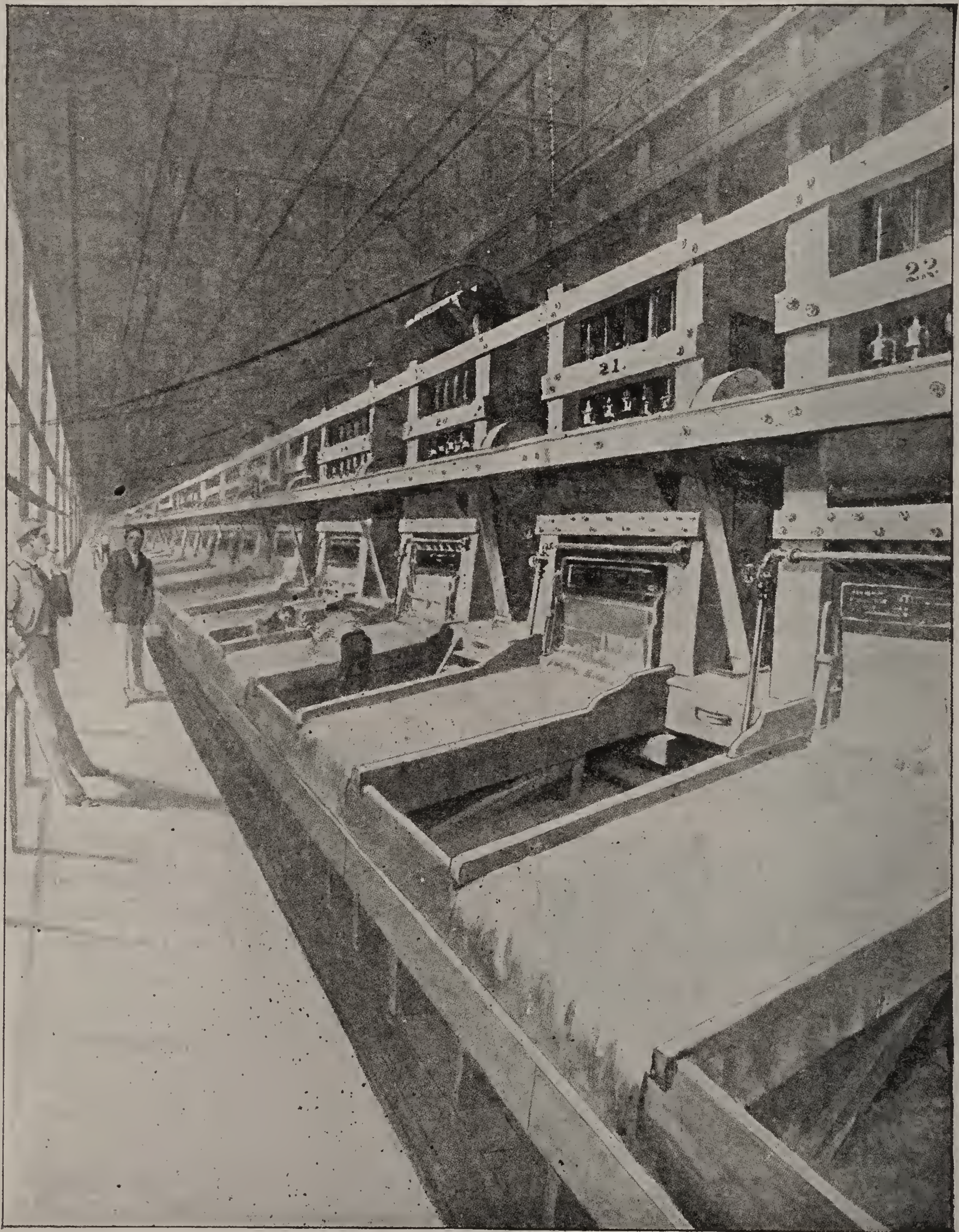
1891	$130,650,000	1896	$202,250,000
1892	146,300,000	1897	238,810,000
1893	157,500,000	1898	287,425,000
1894	181,000,000	1899	306,500,000
1895	198,760,000	1900	257,000,000

Compare this, the production of the world's standard money metal, with that of the preceding decades of this century:

1891-1900	$ 2,106,195,000
1881-1890	1,059,892,000
1871-1880	1,150,854,000
1861-1870	1,263,015,000
1851-1860	1,332,981,000
1841-1850	363,928,000
1831-1840	134,841,000
1821-1830	94,479,000
1811-1820	76,063,000
1801-1810	118,152,000
Total	7,700,360,000

GOLD BRICKS OF THE ASSAY OFFICE, VALUED AT $1,000,000.

With the first year of the new century starting out with an estimated increase of 20 per cent over the most productive year of the past, who can say to what colossal figures the gold output of the twentieth century may not run? And will the economists and statesmen of the future have to consider the problem of a new basic money or standard because gold has become too plentiful and cheap? The United States is not only becoming the greatest gold producing country in the world (including Alaska our territory), but it is the country to which gold most naturally and freely flows by a law of commercial gravitation. Foreign nations have to replenish their gold supply by artificial means. Now that the finances of the United States are on a sound basis gold is flowing to America in a steady stream. It is a remarkable fact that 19,-



JOHANNESBURG GOLD MINE.
Showing stamp battery where the ore is crushed.

000,000 Australian coined sovereigns are now reposing in the government's vaults in this country. They were shipped straight from the Australian mints to the United States in payment of balances which Australia owed London and London owed this country.

It is also a fact that, commercially considered, nearly the entire gold output of North America belongs to the United States and contributes to our circulation and resources. In 1890, 45 per cent of the world's output was produced in North America, and in 1901, after the South African mines have resumed their activity, 35 per cent of the world's production will still come from the mines of the United States, Canada and Mexico.

Canada is coming forward with great strides as a gold producer, thanks to the Klondike region, and the Canadians are vigorously agitating the establishment of a Dominion mint. At the present time the United States coins are used as the basic money of the Dominion, for a bank reserve and the like. Canadians naturally feel that they want a basic coin of their own.

World's Production of Gold as Figured by the Director of United States Mint.

	1898.	1899.
United States	$64,500,000	$71,000,000
Canada	14,000,000	21,000,000
Mexico	8,500,000	8,500,000
Africa	80,000,000	73,000,000
Australia	65,000,000	80,000,000
Russia	25,500,000	22,000,000
India	8,500,000	8,500,000
China	6,000,000	5,500,000
All other	15,000,000	17,000,000
Totals	$287,000,000	$306,500,000

	1900.	1901.
United States	$82,000,000	$94,000,000
Canada	25,000,000	30,000,000
Mexico	8,500,000	8,500,000
Africa	5,000,000	75,000,000
Australia	83,000,000	88,000,000
Russia	23,000,000	33,000,000
India	8,500,000	9,000,000
China	4,000,000	4,500,000
All other	18,000,000	23,000,000
Totals	$257,000,000	$365,000,000

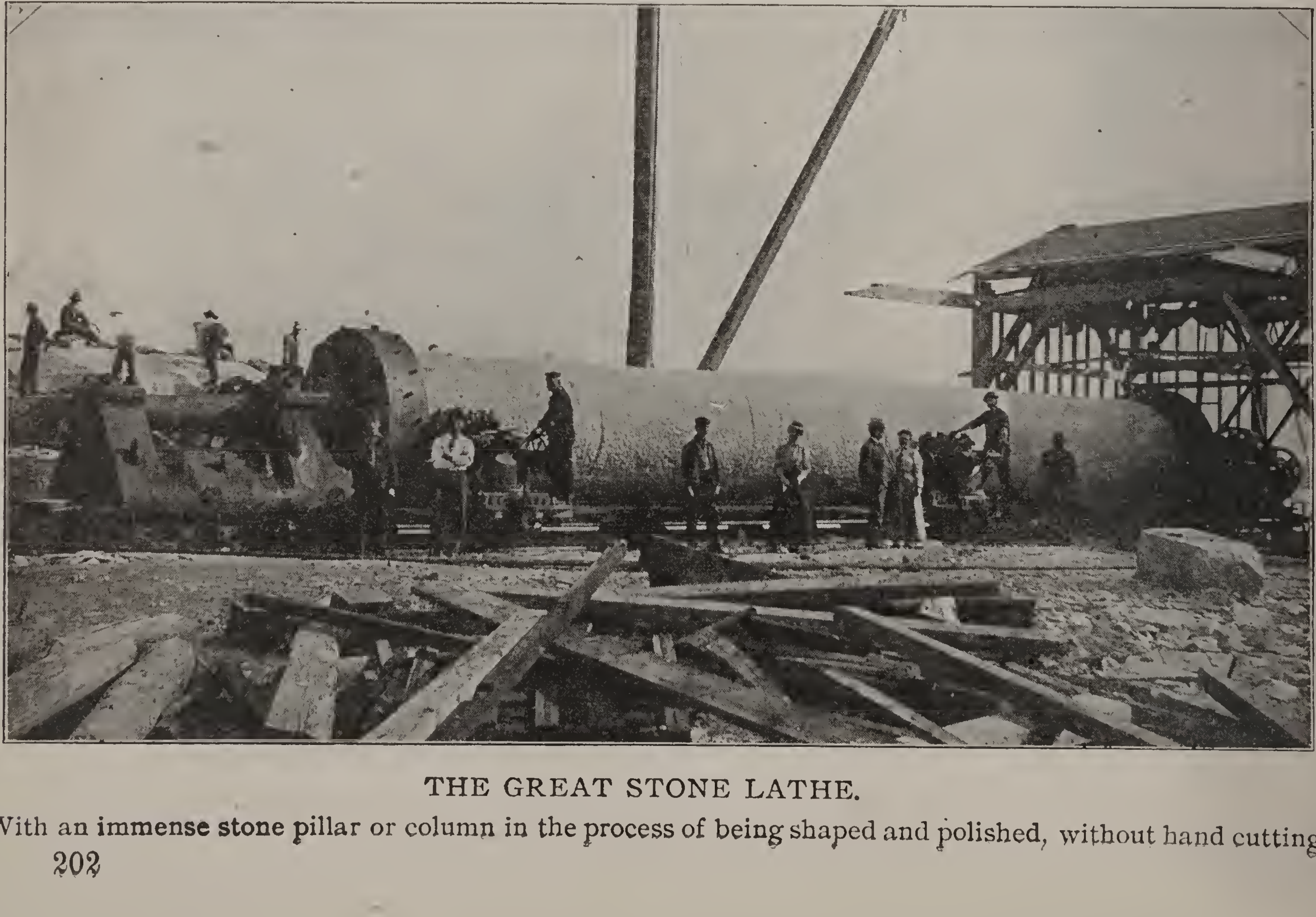
COPPER MINING BY HAND DRILLS IN THE MINES OF NORWAY.
A method replaced by machinery in this country.

GREAT STONE LATHE.

Cutting Stone Into Columns—Cheap Method of Work—Run by an Engine—Saving in Work.

LOOK at this immense block of granite and think of the amount of work that must be put upon it to convert it into a perfectly round, high-polished column. Then look at the companion picture taken only a few days later with the granite already reduced to cylindrical form ready for the polishing process. The machine which works this rapid transformation is the latest triumph in the industrial world. It is called a lathe, and the work that it has been doing since it was installed has demonstrated that it is a success. It renders possible of easy and inexpensive accomplishment construction that has heretofore been very difficult.

The lathe was built in Philadelphia, and has been installed in the granite quarries at Vinalhaven, Maine, where columns of many sizes are being turned out for the Cathedral of St. John the Divine, New York City. In fact, this machine was primarily conceived and built for the



THE GREAT STONE LATHE.

With an immense stone pillar or column in the process of being shaped and polished, without hand cutting.

special work called for by the plans for this great new cathedral of the metropolis, which is to have no less than thirty-two granite columns fifty-four feet long by six feet in diameter, which will weigh when completed 160 tons each. In addition to this it will have innumerable columns of smaller dimensions.

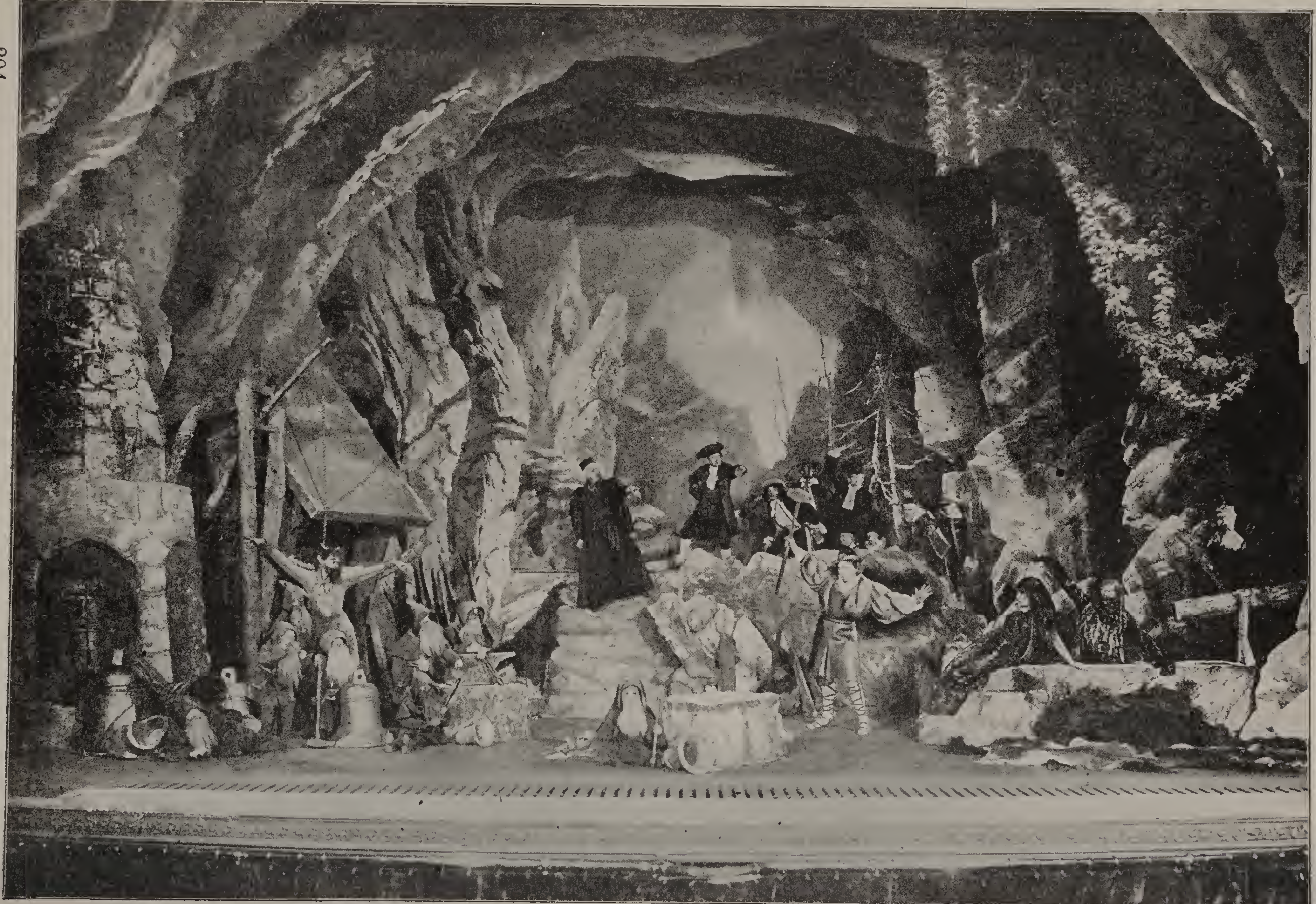
In length the lathe that will perform this work is eighty-six feet, and when in working-order it weighs 135 tons. It has swings 6 feet 6 inches by 60 feet long, and it has eight cutters. Each tool takes out a cut three inches deep, the entire eight cutters reducing the column twenty-four inches in diameter at one pass over the stone.

What It Does.

The block of granite in the illustration weighs 310 tons; it is 67 feet long, 8½ feet high by 7 feet wide. The piece of granite to be cut is rough hewn at the corners by hand, in order that it may be placed in the lathe. Once in the lathe it requires about six weeks to turn out a finished column, dressed and polished. The tool that does the cutting is a circular disk of steel seven-eighths of an inch in thickness and ten inches in diameter. It has a V-shaped cutting edge, and is wedged on the mandrel and held tightly by means of a lock-nut. When the tool is in operation it is set at an angle to the axis of the stone being dressed. The entire stone revolves, and as it does so it imparts a rotary motion to the cutting disks, which are forced into the stone by means of the feed screw.

In this manner the tool splinters off the rock to any required depth, leaving a roughly chipped surface. When this shaping process has been completed there is attached to the tool posts in the same manner as the cutting tools a cup-shaped device holding hardened steel shot, by which the rough polishing is done. The final polish is imparted to the columns in much the same manner, but powdered emory is used in this operation.

When one considers the length of the blocks of granite handled, the idea obtains that there must be many supports to hold the weight while the stone is under treatment, but the fact is the entire weight of the stone is held by head and tail chucks, there being no intermediate supports. This tells in a sentence the quality of the material used in the construction of the lathe itself. When in operation the lathe is run by a fifty horse-power engine. It makes one and three-fourths revolutions a minute at cutting speed, and three revolutions at polishing speed. When the belt is thrown off and the machine runs free, it runs for nearly a quarter of a minute, a fact which shows how well balanced it is. The lathe was first placed in operation in August, 1900.



FAMOUS STAGE SETTING FOR "THE SUNKEN BELL," AS PRESENTED BY E. H. SOTHERN AND VIRGINIA HARNED

QUICK SILVER.

Mines Found In Texas—Ore Is a Brilliant Red Rock—Roasting the Ore—Miners Often Suffer.

NEWLY discovered quicksilver mines in Texas have begun to yield large quantities of the valuable mineral, which hitherto has been obtained only in California. The ore which yields quicksilver is a brilliant red rock known as cinnabar, and when of high purity is vermilion in color. This rock is the original source of the pigment known as vermilion. It is a compound of sulphur and quicksilver, and to obtain the latter the rock must be roasted to separate the sulphur. When this is done the mercury passes off in the form of gas, is collected and afterwards condensed. Then it flows out in a continuous stream like a pencil of molten silver.

The discovery of the veins in California came about by noticing the peculiar vermilion frescoing on the bodies of the native Indians, and learning where they obtained the pigment. Occasionally mercury is found in its pure state, as when a miner accidentally strikes his pick into a little cup or basin of the fluid. Miners suffer a great deal from the poisonous fumes of quicksilver, and must necessarily be very cleanly to avoid sickness, while many use strong lemon juice to counteract the bad effects.

SMUGGLING—HOW IT IS DONE.

Three Classes of Smugglers—Punishment Inflicted by Law—Methods of Offenders —How Guilt Is Detected.

ONE of the most clever frauds against which the United States Treasury Department has to protect itself is that of smuggling. Countless schemes have been originated and brought into play by which the government is beaten out of thousands of dollars in revenue annually. A great staff of detectives is employed constantly by the authorities, but despite their vigilance many persons succeed in getting dutiable goods through the ports. The day is past when the "low-lying rakish craft" of the yellow-covered story book engaged in the trade, and now it is the first-class liners which provide means of transportation for such law-breakers.

Strictly speaking, these smugglers may be divided into three classes. First, there is that host of honest, law-abiding, honorable men who return from foreign ports with many valuables, dutiable souvenirs and goods which they have purchased. Most of these are in utter ignorance of such a thing as a customs law, and never think of it when they are bringing the goods home with them. They bought them abroad simply because they could get them cheaper than in America. These people are surprised and pained when the entrance of their purchases is challenged.

Willing to Defraud.

The second class includes those who are aware of the custom laws, but are willing to take a chance of saving a few dollars by the purchase of goods in foreign ports and smuggling them into this country. Evidently they believe such laws are a species of partisan legislation, and that it is perfectly justifiable that they should evade them.

The third class, which has the least followers, is comprised of what are known as "professional smugglers." This class attempts to do regularly and on a wholesale plan what the second class does perhaps once in a lifetime. The contraband articles of the first class are usually a bit of lace, a precious stone, a quantity of gloves or cosmetics which the possessor wants for future use. With the other it is a business pure and simple.

The punishment provided by law is severe. In addition to the confiscation of goods, both fine and imprisonment may follow. The task of detecting these offenders is very arduous. When five or six hundred passengers cross the gangplank of an ocean liner several revenue officers are stationed about the landing. They closely scrutinize the countenances of the passengers, and so well have they cultivated the art that even a quick glance of the eyes does not escape them if it has a meaning behind it.

Detecting Smuggling.

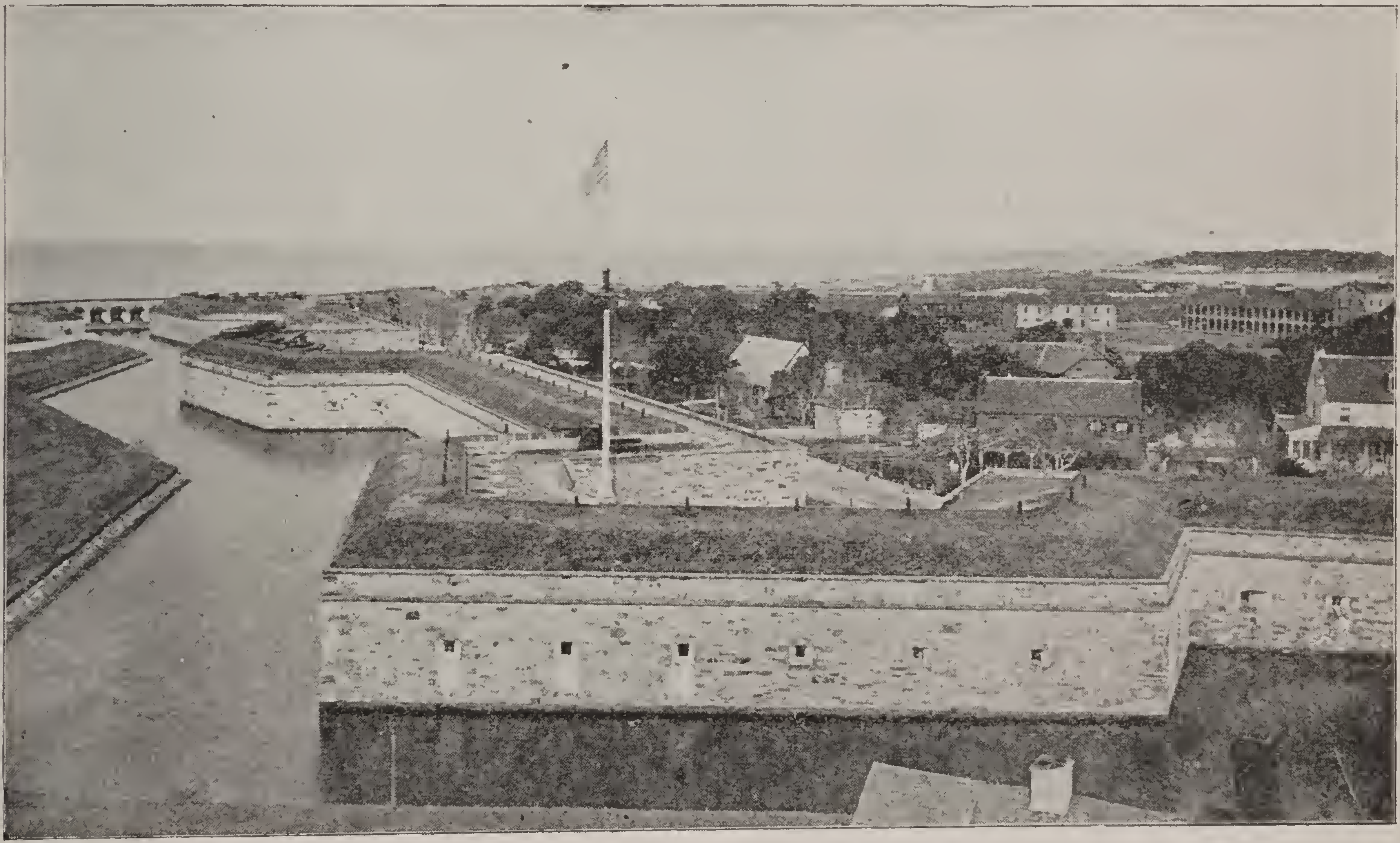
If a man descends with a slight swelling in his waistcoat pocket he may be intercepted and forced to submit to an investigation by the officers. Precious jewels are secreted in divers places on a man's person. In one case a double vest concealing many silver watches was detected. Another time a man was discovered to be much broader about the waist and chest than he really should be. Upon investigation it was found that several yards of very valuable lace were twined about him. Women are also great offenders. Costly jewels have been concealed by them in their bosoms, also laces and other valuables have been secreted on their person. In one instance a man was noticed to limp when descending the gang plank. He was searched, and a large diamond was found between his toes. False bottoms in trunks and telescopes also cause the government officials much trouble. Thousands of dollars worth of valuables have been found under layers in innocent-looking telescope trunks.

PATROLING THE OCEAN.

Work of the Hydrographic Office—The Skipper Recording Observations—Value of Bottles Cast Overboard.

THE ocean has become as minutely surveyed and in its elements as closely tabulated as the land. In its more traveled parts, and frequently in other parts it is being constantly and systematically observed and noted in all its winds, currents, temperatures, depths and obstructions, transient or permanent; and from the records thus obtained the shipmaster is able to lay out his course with great knowledge and precision.

On the wall of one of the rooms of the Hydrographic Office, in the Navy Department building at Washington, hangs a blank chart. It is a large blackboard on which are drawn in outline all the oceans of the world, with the continents which divide them traced between. The parallels of latitude and the meridians of longitude are shown. Starting at various points in the oceans and running over the surface are many irregular lines traced in chalk. At the end of



THE NEW FORTRESS MONROE, IN HAMPTON ROADS, VIRGINIA.

It is the largest of its kind in the world, although not up to date in defence.

each of these lines is stuck a pin, from which is hung a little green tag.

These tags and pins are removed at frequent intervals during the day by an official of the department, the corresponding outline is continued further across the chart and the pin and tag placed at the new termination of the line. On each tag is the name of a derelict vessel that is known to be floating free in the ocean, and the lines represent the course which the derelict has been pursuing, the tag marking the point at which she is reported to the office as having been seen last. On another chart hanging on another wall are lines indicating the tracks of bottles cast overboard and allowed to drift for the purpose of showing the trend of ocean currents. These lines are extended or amended according to information received by telegram or letter.

Other charts show the progress of cyclones, the position and drift of icebergs, the position of waterspouts, the temperature of surface water, the movements of the Gulf Stream, the peculiar aberrations in the audibility of fog signals, the growth of fog banks, the peculiar formation of clouds, etc.

THE EDDYSTONE LIGHTHOUSE.

Built on rock out in the ocean, off England's coast, and defying the powers of the waves and storm. The structure is made of steel.

Work of the Skipper.

When a vessel starts out on a voyage the Hydrographic Office furnishes the captain two small blank books containing forms to be filled in. There is a leaf for each day. One book is a general weather report, the other is a supplementary storm log. All observations are taken at Greenwich noon and recorded in these books. By means of his chronometer and by making observations, the seaman can calculate Greenwich noon to the moment. It is from these books that the daily chart of the ocean is prepared.

The questions asked concern the time of observations; the latitude and longitude; the true direction and force of the wind; the state of the barometer; the temperature of the air and of the surface water; the forms of clouds and the direction of their movements; the state of the waves and the direction in which they are running; the estimated current for twenty-four hours; the weather experienced for twenty-four hours; the apparent periodic time, or intervals, in seconds, between the crests of successive waves as they pass; the true direction from which they come, and the ship's true course and speed at the time; the estimated heights of the several waves, from hollow to crest; the depth of the sea where the observations are made, or at least the exact position of the ship so that the depth may be obtained; information concerning fogs; general description of electric phenomena, and any experience in using oil to prevent heavy seas from breaking on the vessel. In the books are diagrams in which the captain may indicate the exact position of clouds and their height above the horizon.

These books reaching the Hydrographic Office, the reports for each day are grouped and collated, and the balances and averages thus set down on a chart. Captains of vessels are also provided with a number of bottles with a printed form for each covering the time and place at which the bottle is cast overboard. Blanks are left for the entry of the time and place the bottle is recovered, if at all. These bottles prove one of the most fruitful sources of information to the Hydrographic Office.

FORTIFICATIONS OF GIBRALTAR AT THE BASE OF THE GREAT ROCK

These have been built by England, and not only guard the rock but the entrance to the Mediterranean. Gibraltar is supposed to be impregnable.

Derelicts and Icebergs.

A computation made by the Hydrographic Office shows that 1,628 derelicts were sighted upon the North Atlantic ocean within a period of seven years. Of this number 482 were identified. The average number sighted is 232 a year, or nearly twenty a month. In 1893, 413 were sighted, an average of thirty-five a month. As the average term of survival for a derelict is one month, it is estimated that at least nineteen must be constantly floating over the North Atlantic Ocean. There are more derelicts sighted during September, October and November than during other months of the year.

The charts show that most of the derelicts have been sighted in the Gulf Stream off the coast of the United States north of 30 degrees north latitude and west of 60 degrees west longitude. The number gradually decreases toward the eastward, along the routes of transatlantic steamers. About fifty ocean-going vessels are known to have collided with derelicts in the North Atlantic within a period of seven years.

Icebergs are a menace at sea, there being danger of colliding with them at night. According to observations made by the Hydrographic Office great accessions o icebergs come in cycles, there being years during which few or none are sighted and again years when the number is great From 1891 to 1895 numerous icebergs were sighted, and also during the year 1898 Waterspouts are a source of danger at sea. Specifically, a waterspout is a whirlwind over a body of water, producing the appearance of a solid column of water extending from the surface to the clouds. In reality, the phenomenon that is seen is the cloud brought down to the earth's surface by the rapid gyratory motion of a vertical whirl. At first the cloud has the form of a tapering funnel, but as it descends near the water's surface it draws up the water for a distance and imparts to it its whirling motion. The height of the spout depends upon the hygrometic state of the air; in general it is between 800 and 2,500 feet. Waterspouts are most frequent in tropical and equatorial regions.

SHIPS AND ICEBERGS

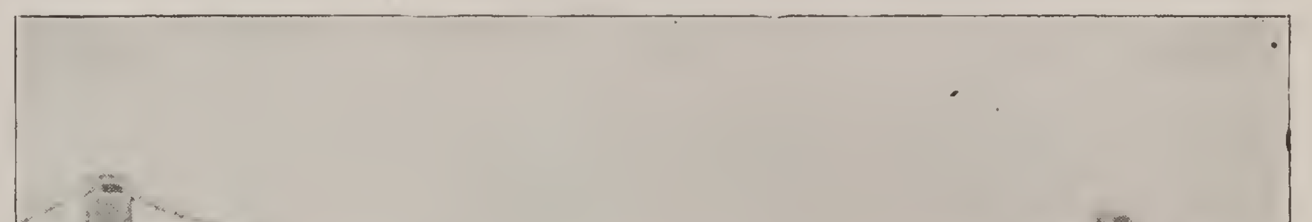
NIAGARA FALLS.

auty of the Falls in Winter—Will Have Disappeared in Two Thousand Years—Annual Horse Power.

ICE forms at Niagara Falls each winter 100 feet thick. Much has been said about the wonders and impressive solemnity of the falls in the summer onths, but to realize the great works of ture at that spot one must visit the rld-renowned spectacle in the winter. hen the thermometer is below zero is time to visit one of the greatest sights the world. The rocks, the trees, the rubs, have all disappeared, and in their ead one finds monrous ice formations, es staggering under weight of massive lections of frozen por, and rocks which esent the appearance small ice-clad mountains.

Regardless of the enic effect the famous e bridges of Niagara are the most interesting atures of a visit to the ls. Weeks of severe ld weather are acuntable for the formation of these bridges. he ice in Lake Erie flows down with the current in great bodies after it melts from the effects of a few days of sun. As it reaches the river its speed is accelerated. Then it reaches the current proper, and is hurled through the rapids at marvelous speed.

When large floes come down the river the ice gathers in great quantities on the reefs and bars above the falls. In many winters the direction of the current of the stream has been diverted entirely. Sometimes it is made possible for persons to cross on the ice formations, and points which are seldom accessible on other occa-

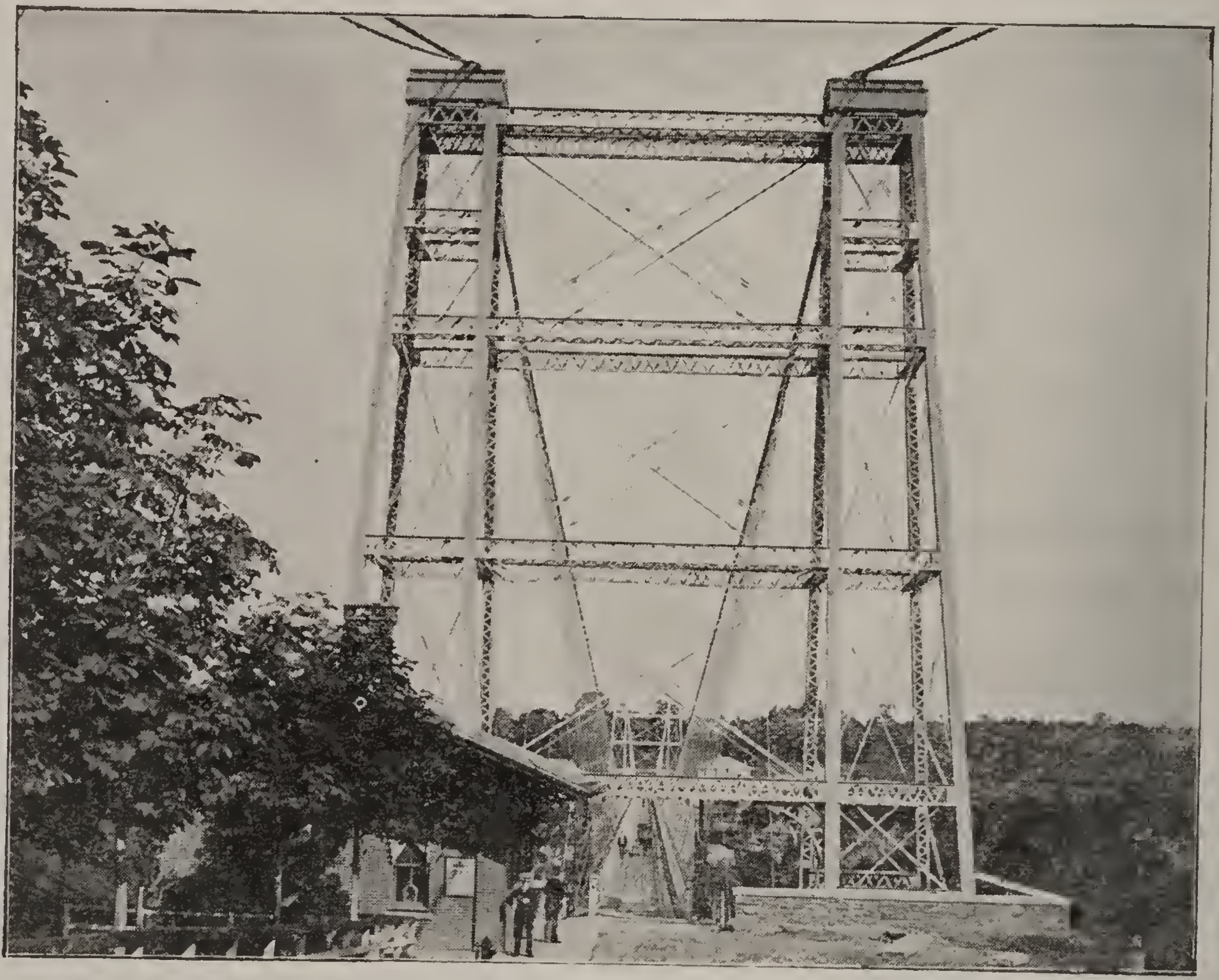


NIAGARA SUSPENSION BRIDGE.

Looking up from the river which itself comes from the famous falls.

sions have been reached by crossing on the ice bridges. At one time the ice formations so completely interfered with the flow of the stream that the water in the Niagara River was reduced to half its original depth. It remained so for a few days, when the formation broke and the water came rushing down again.

Persons watch for days the formation of these bridges in hopes of being the first to cross. It is a dangerous feat, but is risked by many. These feats are heralded all over the country, and the name of the first to cross the new bridge is recorded throughout the adjacent towns. In some instances, horses are known to have crossed from the Canadian to the American side in safety.



THE FAMOUS CANTILEVER BRIDGE OF NIAGARA FALLS.
Showing the American entrance and guard's cottage.

Falls Slowly Receding.

Niagara Falls were discovered in 1678. They have receded in the last 175 years 76 feet from where they originally were. Their height at the American falls is 1 feet, at the Horseshoe 158 feet. T average recession of the falls or breaki away of the rocky front over which dashes is about 2.5 feet per year. Bel the falls the descent of the river is 15 fe per mile. Their width at the Americ falls is 600 feet, at the Horseshoe 1,8 feet. The amount of water which pass over them is 270,000 cubic feet p second. They receive their entire wate supply from the Great Lakes and th water sheds about them.

Scientists have calculated that at th present rate at which the falls are crumbling away they will pass out of existenc in about 2,000 years. They are no used extensively for the development o electrical horse power. Electrical work have been erected at the base of the fall for the development of horse power. I is estimated that 8,000 horse power pe year is thus secured. This is distribute neighboring cities and sold on the sis of $25 per horse power per year. connection with the formation of the lls, geologists have discovered that at e time the waters of the Great Lakes wed into the Mississippi River and the falls did not exist. Subsequent upheaval of the earth created the continental divide at Summit, twelve miles from Chicago, and after that the waters of the Great Lakes worked their way eastward and formed the famous falls.

PROVISIONING AN OCEAN LINER.

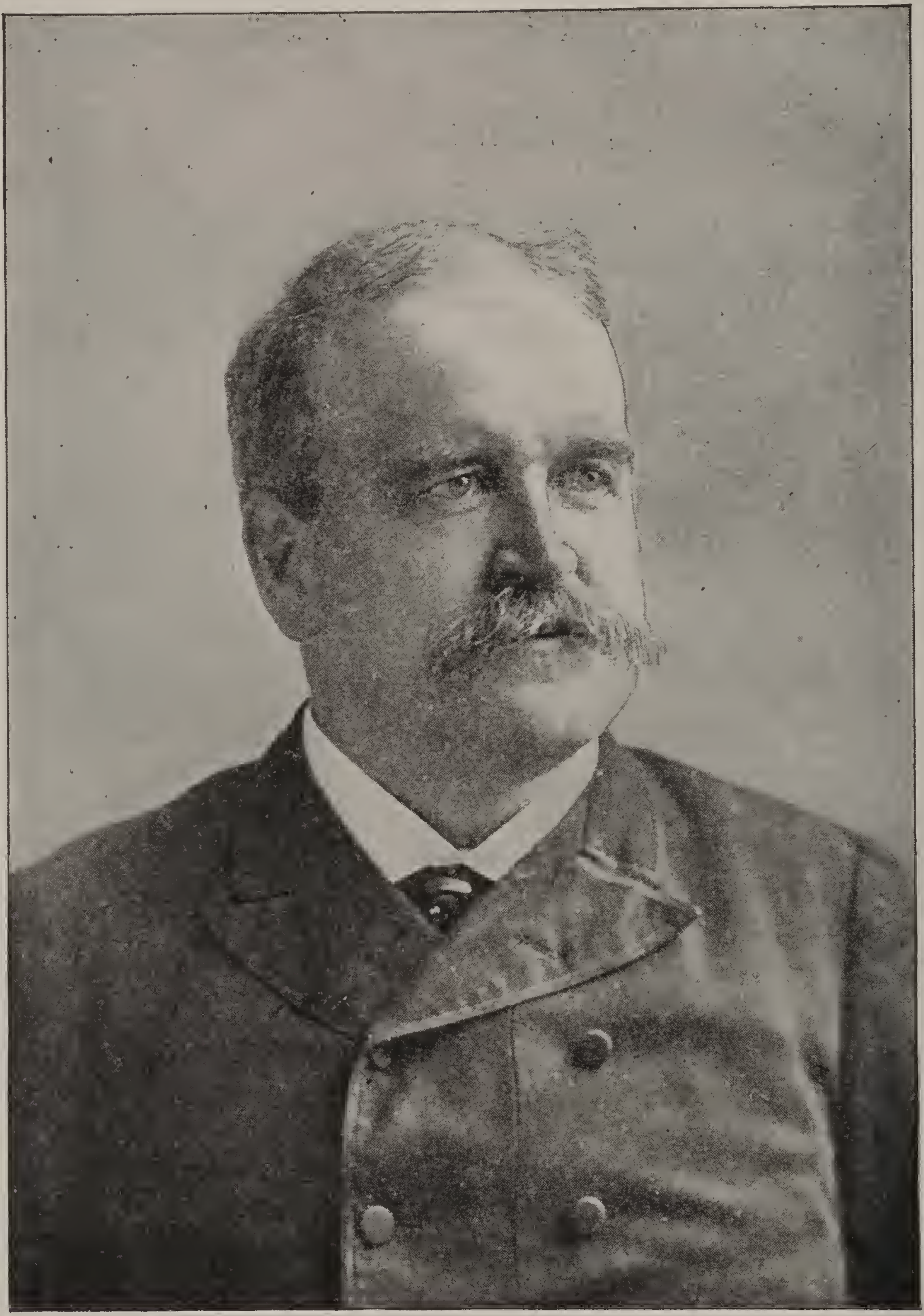
Capacity of Modern Ocean Liner—Game in Great Demand—Jellies and Sweets Consumed.

PROVISIONING an ocean liner of the modern type is one of the greatest wonders of twentieth century steamship transportation. It would be impossible for an uninformed rson to estimate the amount of pro- sions which must be put into one of ese vessels for a round trip from the ited States to Europe, covering a riod of twelve days—six over and six ck. Before trying to make any calcu- ions the number of passengers carried one of these sea monsters must be con- lered. Taking one of the most modern pe as a criterion, the following facts and ures will give the reader some idea of e magnitude of the enterprise. The ssenger capacity of one of these floating laces is usually 2,000 persons, not in- ding the crew and other employés ached to the vessel. She will carry 350 loon passengers, 275 second cabin, and oo third class, with a crew of about , 150 of whom will be in the steward's partment. So much for its capacity for man freight.

The amount of bread consumed on a yage is startling. The total amount of flour stored for bread and pastry is 200 barrels. As the gross weight of a barrel is 220 pounds, the weight of this alone is 39,200 pounds or 17½ tons. Meat is also a great factor in an Atlantic trip. In the old days live stock was carried and killed as needed for the table. But since the process of cold storage has been successfully demonstrated it has done away with the old custom and saved much needed space. Great refrigerators are provided which will keep in first-class condition thousands of pounds of fresh meats for several days. In these compartments are stored 20,000 pounds of fresh beef, 10,000 pounds of mutton, 14,000 pounds of lamb, 500 pounds of veal, and 500 pounds of pork.

Game in Demand.

The demand for game in season, especially among first cabin passengers, is enormous. To provide for this the steamship company lays in a stock which far exceeds that of the greatest hotels in the country. The capacity for poultry and game is 5,070, apportioned as follows: 1,500 spring chickens, 500 capons, 200 roasting chickens, 300 fowls, 500 duck-lings, 50 goslings, 120 turkeys, 200 pheasants, 300 partridges, 800 squabs, and 600 quail. This amount is consumed chiefly by the saloon, second cabin passengers and superior officers, so the supply is abundant. These solid comestibles are, however, flanked by large quantities of toothsome fish; 3,000 pounds of fresh fish of various kinds are provided, besides 2,500 pounds of salt fish. The herring is also in great demand, and 30 barrels o these—15,000 in number—are in the refrigerators. Besides these are 50 boxes of smoked fish, 500 pounds of lobsters, 400 tins of sardines, 500 pounds of turtle, 20,000 oysters, 10,000 clams.



JOHN D. LONG.
Secretary of the Navy.

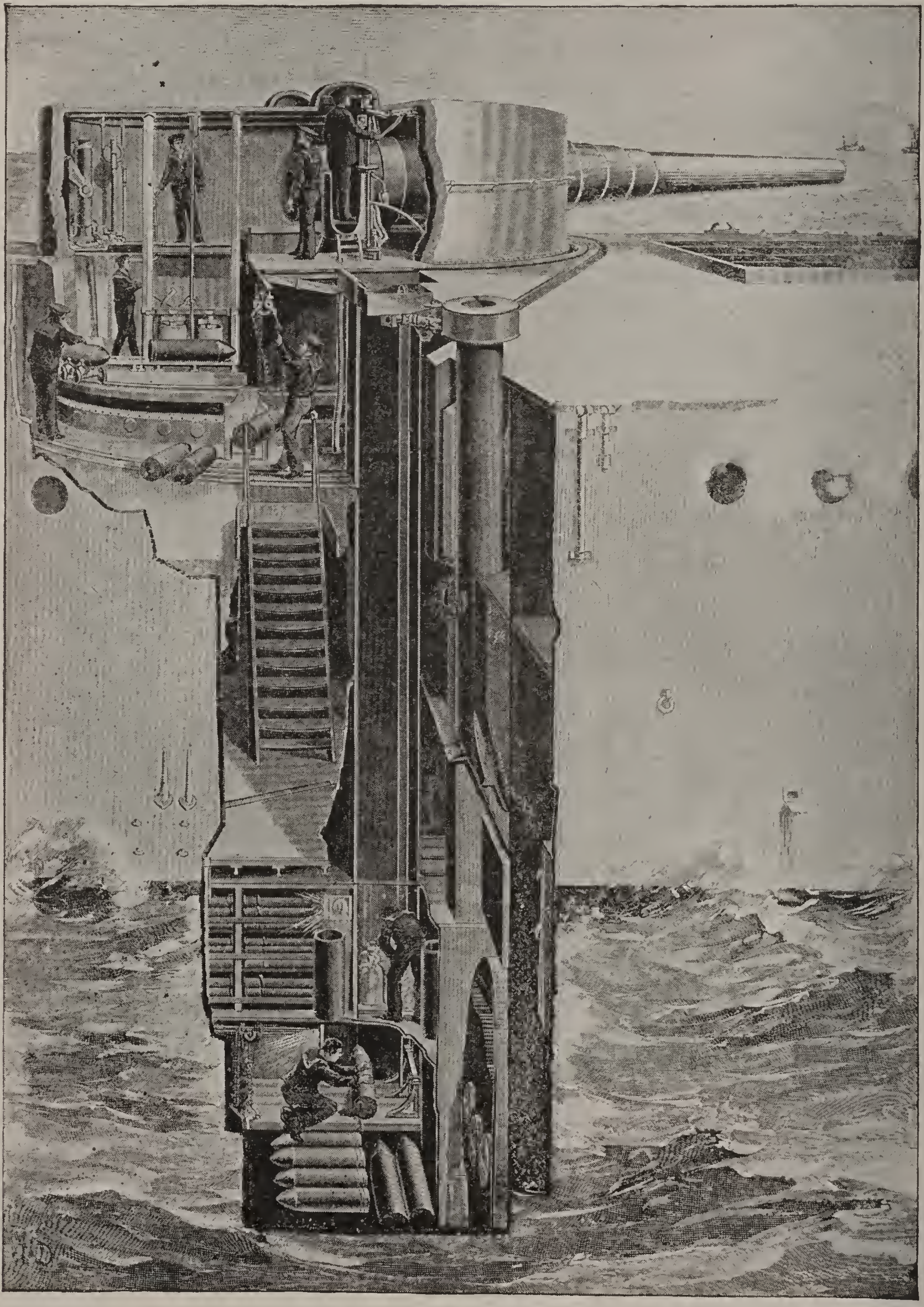
Eggs are consumed to the number of 25,000. If a hen should lay one egg every day in the year, in order to furnish enough for a ten-day trip, she would continue to lay at that rate until 1967. This number of eggs represents the combined annual output of 277 hens. A trifle over 2,500 pounds of oatmeal is carried on a trip. Most of this goes to the steerage passengers. Of ham and bacon, 5,000 pounds—more than two tons—are necessary to appease the appetites of lovers of such food.

EUGENE HALE OF MAINE.
Chairman of the Senate Committee on Naval Affairs.

Butter, jams, jellies and marmalades cut a great figure in provisioning a vessel. The total amount of butter taken on for a voyage is 5,000 pounds. Despite seasickness, 5,000 pounds of jams, jellies, and marmalades find their way to the table in various forms. Ten thousand pounds of sugar, or nearly 4½ tons, go to sweeten edibles and drinks to the tastes of the passengers. Two thousand five hundred pounds of coffee and 1,500 pounds of tea are laid in store for the round voyage.

Amount of Milk Consumed.

A small lake of milk is always on hand. The steward provides 800 gallons of the liquid, which is put through a sterilizing process in order that it will not sour on



SECTIONAL VIEW OF A BATTLESHIP, SHOWING TURRET AND AMMUNITION HOIST.

the trip. In the old days immigrants and other passengers suffered from scurvy and other diseases owing to a want of vegetables. This has been overcome as provisions are now made by which such perishable goods are preserved for days. Forty-six tons of potatoes form another important factor in the domain of the steward.

There are 250 coffee and tea pots, 100 butter dishes, 200 sugar basins, 250 vegetable and entrée dishes, 10,000 pieces of china, for first and second class passengers, and 3,600 plates and 1,500 cups for third class use. In the course of the year—about ten round voyages—the principal items of provisioning would total up as follows: 62,000 pounds of butcher's meat, 50,700 poultry and game, 200,000 oysters, 250,000 eggs, 15,000 pounds of tea, 25,000 pounds of coffee, 200,000 oranges, 50,000 pounds of butter, and 2,000 barrels of flour.

COST OF A NATIONAL ELECTION.

The National Committee a Business Organization—Collection and Disbursement of Funds—Amount of Money Expended.

IT cost $600 to nominate Abraham Lincoln for President, and $7,000,000 to elect William McKinley President of the United States. These figures represent the growth of political campaigning in thirty-six years into a great business with a perfect system of organization. The total expenses of a political campaign in which a President and high State officers are elected exceed the entire cost of the federal government for the first few years of its existence. Chairman Gorman of Maryland and Senator Quay of Pennsylvania are the men who, as chairmen of the national executive campaign committees of the democratic and republican parties in 1884, introduced into American politics the present system of conducting national campaigns by means of thorough organizations throughout the country and the expenditure of vast sums for speakers, literature, music, and other spectacular features.

The business affairs of the great political parties are intrusted to national committees, composed of one member from each State and Territory, who are elected by the delegates to the national conventions at the time the conventions are held. The chairman of the committee is always the choice of the nominee for President, and in the power of this chairman rests the entire campaign.

National headquarters are opened soon after the candidates are nominated. Committees are appointed, and the principal work—that of getting money—is begun immediately. Circular and personal letters are sent out to strong men and great corporations. Many of these corporations contribute to both funds, so that they may have supporters no matter which party is elected. Because of the civil service regulation no money is supposed to be raised by assessment. Everything is given as a donation, in theory at least. No books are kept, and the expenditures are known only to the chairman of the committee. The bulk of the money, however, is turned over to the treasurer.

SENATOR M. A. HANNA.
Chairman of the Republican National Committee, 1896 and 1900.

Providing Literature.

The greatest task before campaign managers after the headquarters are opened is that of providing literature. Much stuff is submitted by outsiders, but a staff of expert political writers is employed to compile facts and figures from the records of Congress. The greatest book or publication is the text book. This contains many arguments in favor of the party, and also much information upon which speakers base their addresses. Over one million of these are printed by each party within a month. More than $250,000 is spent in printing this literature for one party, and the cost of distribution is equally as much.

Another department under the supervision of the chairman of the national committee is the "speakers' bureau." Many prominent senators, congressmen, and other politicians of note volunteer their services to the cause for a number of speeches wherever the party desires them to go. They receive no compensation, but the headquarters stand for their traveling expenses. Then there is what is known as "spellbinders." These are paid to make speeches, their salaries ranging from $500 a speech to $100 per week. Their speeches are usually censored before delivered. An army of orators is in telegraphic communication with headquarters daily. They report how they were received at towns along the road and other incidents which may prove of interest to the managers.

Handling the Press.

There is the press committee. This deals with editors of small papers who demand a compensation for their support of the party. They come into the office, state the circulation and influence of their paper, and offer to give the party advertising and support for a fixed sum paid in advance. After a little talk, this is granted if the price, which is five or six times regular advertising rates, is not too great.

By August all these preparations have been completed. The "straw" calculations are then made. Experts and canvassers are employed in all districts to find how the voters stand. If favorable to the cause pamphlets are published stating the number of votes "which will be cast on election day." These are not merely guesses, but are compiled with great accuracy. If unfavorable districts are reported the work of the committee is doubled in that doubtful territory.

When the party has money on hand the expenditures of a day amount to more than $50,000. Besides this amount an emergency fund is put away by the chairman of each national committee, the amount of which only the chairman knows. This sum amounts sometimes to $50,000,000, and other times $1,000,000. A secret service system is also part of the great organization. Special detectives are hired to find out the condition of doubtful districts, and reports are made to headquarters. The money expended by the national committee is but a small part of the expenses of State campaigns and elections throughout the country. In the larger States each party organization spends from $100,000 upwards to $1,000,000 working for the election of the State ticket. The expenditures in large cities are enormous, and the expenses of thousands of candidates throughout the country cannot be ascertained. The cost of the political campaign of 1900 is reckoned at about $25,000,000. The major portion of the cost is borne by people who live or profit by the business of politics.

THE BIGGEST BIRD THAT FLIES.

Attains the Greatest Heights Possible—Carnivorous Appetite—Keen Power of Sight —Other Big Birds.

THE ornithologists of Great Britain and America have decided that the largest bird that flies is an American bird, the great condor of the Andes. To another bird, which is American now, has been given the second prize. It is the fierce, harpy eagle of the Philippines. Our own turkey comes near the second place, and if England succeeds in her attempt at reintroducing the famous great bustard into the tight little island, it will have the next largest bird to our turkey.

In the United States we have, besides the turkey, four other birds which are ranked high in the list of the largest flying birds. They are the beautiful golden eagle, the national bald-headed eagle, the great wild swan, known specifically as the whooper, and the California condor, which is almost as large as his South American brother. In many respects the South American condor is the most remarkable of all living creatures. No other bird can fly so high. Humboldt saw one flying over Chimborazo at a height of over 23,000 feet. It seems to fly as easily and breathe as easily in the rarefied atmosphere at that great height as it does at the level of the sea. No other created being can do this, as no other living creature can lift itself so far above the earth. When flying, it sails in majestic circles or hangs poised in the air as if suspended there by an invisible cord.

Darwin once watched a condor for half an hour as it hung over an Andean valley, and never once did he detect the slightest movement in the great bird or its widespread pinions. Its home is above the snow line, and it chooses as its favorite dwelling places where great cliffs descend sheer down for thousands of feet. It wanders sometimes to where the cliffs of Patagonia frown over the troubled seas, but prefers to seek its food in the mountain valleys. It is a bird blessed with an appetite as remarkable as itself, and one condor has been known to devour a calf, a dog, and a sheep in a single week. On the other hand, it can go without food for more than forty days.

Keen Power of Sight.

Probably no other created animal has such keen sight as the condor. From tremendous heights and from great distances it can spy a carcass, and will swoop down on it with the rush and speed of the wind sweeping through the mountain gorges. Though a good-sized condor measures fifteen feet in its expanse of wing—condors have been shot with that spread—there seems to be no authentic record of the weight of a condor of that size. The weight of the bird is estimated by good authorities, however, at about forty pounds for one with a fifteen-foot spread of wing.

In putting forward the claims of the

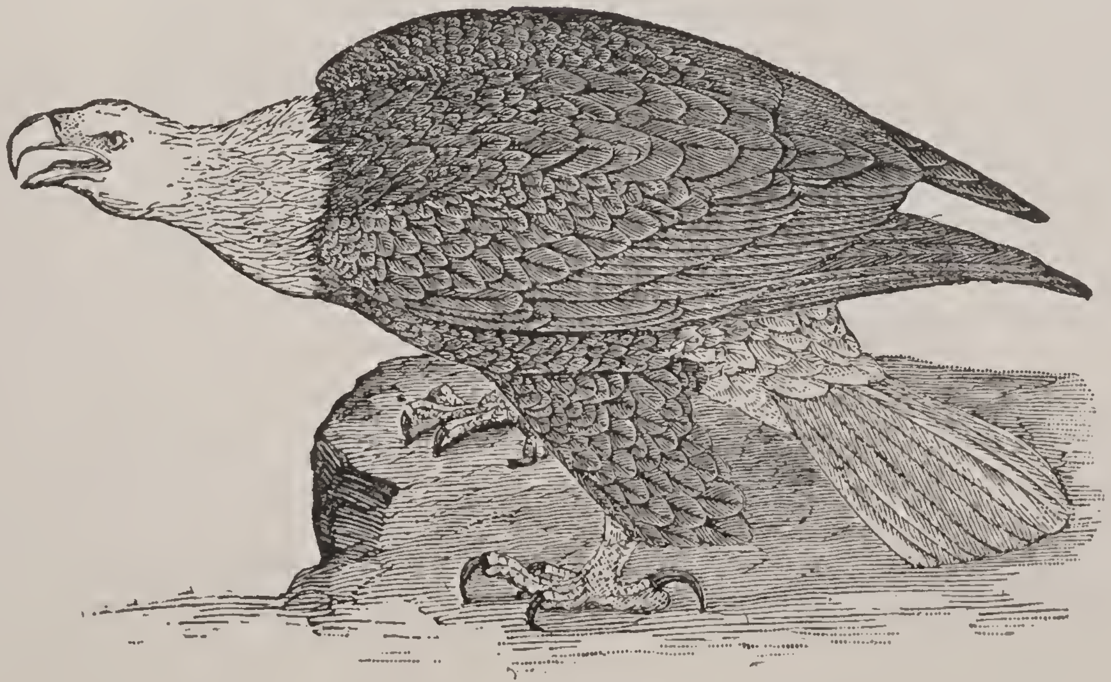
turkey to be the third largest bird that flies, if not the second, the tame as well as the wild bird must be taken into consideration, for the domestic turkey certainly can fly, and sometimes ascends to the "tipmost top of the tallmost trees," though it is not so lively on the wing as its wild brother. Benjamin Franklin wanted to have the turkey adopted as the national bird of the United States instead of the eagle, and made out a good case for the bird as against the claims of his successful rival. Why the bird in question is call a turkey has been much discussed without reaching any definite conclusion. One theory is that the turkey names himself by his peculiar "cluck," which sounds like "turk, turk, turk."

Weight of Eagles.

There is a splendid specimen of the harpy eagle in the Washington Zoological Park, which weighs between twenty-eight and thirty pounds. When it is considered that the golden eagle weighs only twelve pounds, the sea eagle only sixteen pounds, and the Spanish imperial eagle only a little over ten pounds, it will be seen that the harpy undoubtedly is entitled to be considered the largest of eagles, if not the second largest of flying birds. No measurements which can be accepted as exact scientific records have been taken by the ornithologists of the length of body and spread of wing of this great and fierce bird, but it is established that the bird has a spread of at least ten to twelve feet.

There are those who not only demand second place for the bustard, but are inclined to give him first place among the birds that fly. Even such an eminent authority as J. E. Harting, of London, seems to incline that way. But the biggest bustard Mr. Harting cites is the Seville bustard, with a weight of thirty pounds, and the biggest authentic spread of wings he cites is only seven feet three inches. The German naturalist, the younger Naumann, tells of bustards weighing thirty-two pounds, and says that he has been assured of the former existence of specimens of the bird weighing thirty-five or thirty-eight pounds.

In speaking of big flying birds, the wild swan should not be forgotten. This bird sometimes attains to a weight of twenty-five pounds, and has an expanse of wing of seven feet. The albatross sometimes weighs seventeen pounds, and has fourteen feet expanse of wing. The laemmergeier, the great bearded vulture of the Alps, is the bird told of most frequently in song and story as a kidnapper. As a matter of fact, it is doubted by the best authorities if the laemmergeier ever stoops to any but a carcass.



THE HAWAIIAN ISLANDS.

Beautiful Scenic Effects in the Islands—A Famous Precipice—Natives Believe in Education—Growth of the System.

THESE beautiful islands, the "Paradise of the Pacific," are located about 2,000 miles from California, nearly in the center of the Pacific Ocean, and just on the edge of the tropics. Enjoying, as they do, the combined advantages of the tropic and temperate zones, the climate is ideal—in fact, the absence of extremes of heat or cold is so noticeable that the natives have no word meaning weather. The climate is so mild and the soil so fertile that one writer says:

"One could live there yearly an existence of charming idleness upon the capital expended monthly in the cold latitudes of the United States for ordinary comfort."

There is little incentive to actual toil. So easy is life that it may easily become too easy. There are eight inhabited islands in the group, and a total area of nearly 7,000 square miles, the population numbering over 100,000. Honolulu, the capital, situated on the island of Oahu, has about 30,000 inhabitants, and is a city of great beauty. It has wide streets lined with palms, handsome residences embowered in trees, beautiful gardens filled with rare, strange plants, blocks of business buildings of the latest architecture, and all the accessories of modern civilization—gas, electric lights, street cars, schools, hospitals and public buildings. Honolulu, under the American flag and the influence of our social customs, is the most charming residence place in the world. The principal points of interest in the vicinity of Honolulu are:

Punch Bowl Hill, an extinct crater about twenty miles distant from the hotel, from whose summit, some five hundred feet above the sea level, can be seen all the surrounding country from Waikiki to Pearl Lochs, Diamond Head, the Waianae Mountains and Kapiolani Park, forming a beautiful panorama.

Mount Tantalus, in the rear of Punch Bowl Hill, rises 2,000 feet, and here are obtained the best possible views, embracing an area of more than fifty miles, and as the approaches to it are through beautiful groves, it is a most delightful trip. Continuing on to Mount Konahuanui, which is 4,000 feet in height, the eastern side of Oahu can be seen, also the Koolan villages and bay.

A Famous Precipice.

The Pali, a famous point, six and one-half miles distant from the hotel, can be reached easily either by carriage or saddle horse. It is some 1,200 feet above the sea level, ascending very gradually, with the mountains on either side lifting their peaks 3,000 feet high, and when the last hill has been reached the view is sublime; while to reach the summit one passes through a gorgeous array of ferns, plants and shrubbery of all varieties known to the tropics. It was here that King Kamehameha took such terrible vengeance upon his foes, driving them over the edge of the precipice, a fall of 500 feet.

Waikiki, a fashionable seaside resort where many of the residents of Honolulu have their summer homes, is a charming spot and a favorite place for turf bathing and aquatic sports, for which the natives are famous.

Great interest has been manifested by educators in this country in the schools of Hawaii. Hawaii provides for education upon the principle that all classes, whether citizen or alien, are entitled, without condition, equally and alike to the benefits of state education; a principle that contemplates a single system of schools, with equal privileges, open and accessible to all. Following this up and developing a school system upon it there is already provided the Lahainaluna school of manual training; the Armstrong Institute, an association of teachers for the introduction of industrial work in the schools; a series of agricultural lectures for the benefit of all classes; a reform school, located at Waialee, having the use of 733 acres of ground; the Honolulu Normal and Training School; a summer school and kindergartens.

During the latter part of 1899 one twelve-room school and one three-room school were erected on the island of Oahu; twelve new school structures on Hawaii; one on Maui, an addition to the school on Kauai. The buildings are by no means as expensive as those erected in

HAWAIIAN CHILDREN IN BATHING.

A tropical foliage scene.

the United States, and as a rule have only from two to three rooms. The general school laws of the islands first came into effect in 1840, but were not of practical effect until after the Ricord legislation of 1846. The real development of the school system commenced in 1847 under Richard Armstrong, a son of Gen. S. C. Armstrong, famous in connection with Hampton Institute. Since his time, with many setbacks and many discouragements, the growth of the school system has been steadily upward and steadily toward American thought.

Inmates of Reform Schools.

The Honolulu High School is one of the institutions of the educational system which all Hawaiians feel proud of always. It is not accredited at any of the universities of the United States. The high school is especially adapted to the needs of those who speak the English language as a mother tongue. The royal school is being developed along the line of a polytechnic. In school statistics there is much of interest as to the character of the nationalties living in the island group. For instance, the number of inmates received in the reform school during 1898-1899 were 69. Of these 40 were Hawaiians, 8 part Hawaiians, 14 Portuguese, 2 Chinese, 1 Japanese, 2 American, 1 Italian, and 1 German.

The offenses for which they were committed were: Truancy, 26; larceny, 31; disobedience to parents, 4; assault and battery, 2; malicious injury, 2; accessory after fact, 1; vagrancy, 1; common nuisance, 1; and burglary, 1. The number of public schools in the islands are 141, private schools 48, making a total of 189. The number of male teachers are 192, and female 352; total, 544. The number of male pupils are 8,651, female 6,839; total, 15,490. Of these 11,436 are in the public schools. The nationality of the pupils attending school is:

Hawaiian	5,043
Part Hawaiian	2,721
American	601
British	213
German	337
Portuguese	3,882
Scandinavian	84
Japanese	1,141
Chinese	1,314
South Sea Islanders	30
Other foreigners	124

The people of Hawaii are proud of their school system, and what it has accomplished under disheartening circumstances.

DREDGING.

Various Kinds of Dredges—The Purpose of Each—Some of the Largest Dredges and their Capacities.

THE largest dredge in the world was invented in Chicago by Lindon Bates and is in use by nearly all foreign governments. Within the last few years great improvements have been made in dredges and dredging machines for excavating rock or earth below the surface of the water. The most common kinds are the clam-shell dredge, the dipper dredge, the continuous-bucket dredge and the suction dredge. Particularly adapted for excavations in very hard material like hard-pan and blasted rock are the dipper dredges. The clam-shell and bucket dredges work best in soft tenacious material like clay, and the suction dredge does especially good work in sand, silt and other soft material.

In 1899, in work on the Buffalo, N. Y., breakwater construction, was a clam-shell dredge of enormous proportions. Its bucket capacity was ten cubic yards, and it took material from a depth of from sixty to seventy feet under the water, when running full capacity, at the rate of 4,000 cubic yards a day. The bucket when empty weighed fifteen tons and held forty tons of clay. Its machinery was so powerful that it could handle one bucketful a minute under sixty-five feet of water.

Two large suction dredges have been employed on the New York Harbor improvements. They have steel hulls, and have force to pump sand through tubes at the rate of 40,000 tons an hour. The hoppers of each dredge have a capacity of 3,000 tons of wet sand. Each dredge measures 320 feet long, 47 feet 10 inches beam, 20 feet 6 inches deep; draft, loaded, 16 feet 4 inches. For pumping sand each dredge has two centrifugal pumps with sixteen-inch suction and delivery pipes, each pump being worked by triple expansion engines.

Enormous Bucket Dredge.

Employed at Karachi Port works, India, was a chain-bucket dredge 236 feet long, 42½ feet beam, 16 feet deep and of 1,250 ton hopper capacity. In Vladivostock harbor there was a chain-bucket dredge 162 feet long, 33 feet wide, 12½ feet deep. Its hull was of steel, and it could excavate 457 cubic yards of compact clay an hour. In work on the Volga River in Russia was a suction dredge made in two parts—to be worked combined as one large dredge, or separate. Each part was 216 feet long, 33⅓ feet wide, 9 feet deep and 4 feet 8 inches draught. They were propelled by electric power, and had a wonderful capacity. One of the largest dredges in America is a dipper dredge on the Great Lakes. It is 132 feet long, 42½ feet wide, 13½ feet deep, and has a dipper capacity of 8½ cubic yards. The weight of the dipper is sixteen tons, and its capacity is from 5,000 to 6,000 cubic yards in a ten-hour day.

The Bates dredges, which have so far surpassed all others in size, were first used on Chicago's drainage canal. Later the English government used them, and then the Russian. That they were invented by an American is another evidence of the progress of this nation.

Oyster dredging is most extensively practiced in the Chesapeake Bay near Baltimore, Maryland. There the finest oyster feeding grounds of the world are found. Oysters are gathered by the use of a system of drag dredges which are dropped into the bed of the stream in which the oysters feed and grow, and then drawn along by the boat to which they are attached above. When they are loaded they are lifted to the surface and their contents dumped into the boat.

Government inspectors continually watch this work. Otherwise, through the carelessness or criminality of the oyster dredgers, the oyster itself would soon be exterminated. These government inspectors compel the dredge men to return to the waters oysters which have not reached a certain age. There are certain months in the year during which the dredging is not permitted, and the government patrols the oyster feeding ground with boats on which cannon are mounted.

OYSTER DREDGES AT THE WHARF, NEW ORLEANS.
The Gulf Oysters are fatter and different in flavor from Chesapeake Bay varieties.

Body Dredging.

The police of all the large cities located on streams have a dredging system for recovering the bodies of people lost in the water. The most common term used for these dredges is "grapples." These grapples are strong iron hooks, weighted, and which are attached to long ropes. When thrown out of a boat they sink to the bottom of the stream. They are then drawn along in the expectation that their hooked ends will catch in the body of the ost person or the clothes, thus enabling t to be brought up. Despite the care with which the police dredge, most of the bodies lost in water are never recovered.

Gold dredging is a process used in the mining countries where the gold is not in quartz but in placer form, upon or near he surface of the ground, and loose. An iron bucket or dredge is run into this by hand or steam power, and the loose material taken up and deposited in running water. This water is so arranged that it separates the gold from the earth, carrying the earth away and depositing the gold in pans. Diamond dredging is of the same character, the water carrying off the blue earth in which the diamonds are found, and leaving the precious stones in sight.

Deep sea dredging is usually undertaken for the purpose of bringing up for naturalists the flora on the bottom of the ocean. This dredging is accomplished with great grapples, which are let down into the ocean to the depth of one or two miles, and when they come up the clinging seaweed and strange growths of the ocean bed are attached. By this method naturalists have mastered many of the secrets of the ocean.

BASALTIC ROCK FORMATION CAUSED BY WATER EROSION.
Marked examples found in the United States and Ireland.

BATTLESHIPS IN SAMOAN WATERS—NATIVE MERCHANTS TRADING FRUIT AND VEGETABLES

PETRIFIED FORESTS OF ARIZONA.

The most Remarkable in the World—Originally Composed of Firs—May Become a National Park.

THE most remarkable petrified forest in the world has been discovered in the northwestern part of Apache County, Arizona. According to geologists, the specimens found in this forest are the most wonderful of their kind in existence. Originally the forest was composed principally of fir trees It is eight miles square and is located on a plateau 5,500 feet above tide water, but the theory has been advanced that in its original state the woodland existed at a much higher altitude. The surroundings of the forest are especially desolate, nothing growing in that region save brush and soapweed.

THE GIANT'S CAUSEWAY.

North coast of Ireland. Natural rock formation created by water and fire. Ancient legends said that fabled giants used it for a path.

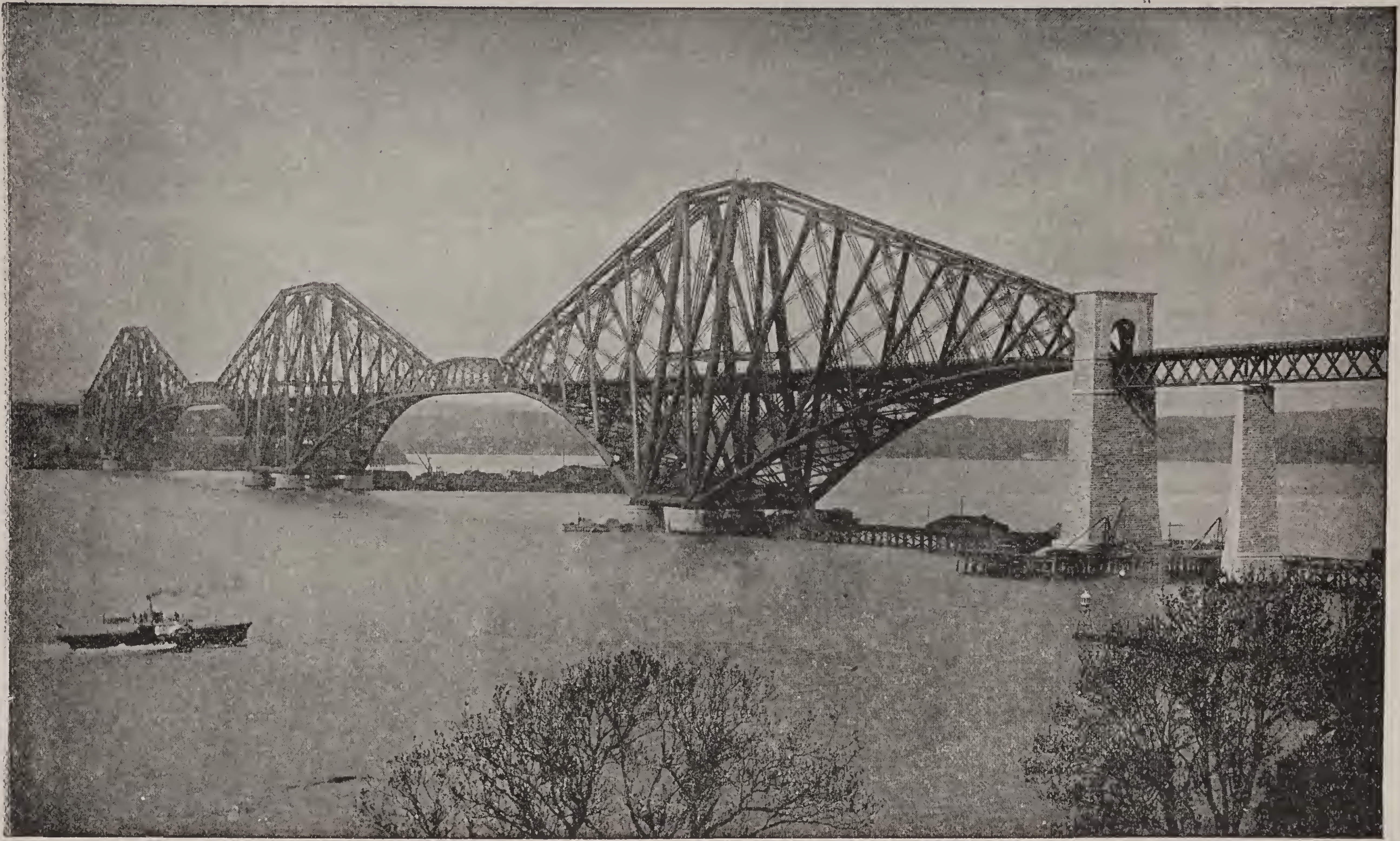
The greater part of the trees are completely petrified as far as the wood is concerned. They have an outer coating of sand and gravel which it is believed was formed by the action of the elements and by the movements of the trees at different periods in the world's history. The forest is extremely picturesque, but much of the scenic effect is destroyed by the barrenness of its surroundings. Geologists have advanced many theories for the petrification of the trees. One scientist claim that ages ago a volcano shower buried a number of forests in the southwest, and that the action of the water in later periods produced the necessary chemical action to change the woody matter into its present form. There is, however, little evidence of volcanic action in the region adjacent to the Arizona forest. Congress has been petitioned to set aside the land as a national park.

A WIRE THAT TALKS.

Mechanical Devices Used—Comparison with the Telephone—Method of Magnetizing the Wire—A Novel Invention.

THINK of a phonograph without a cylinder or diaphragm, a phonograph that simply strings its records on a piano wire, as you might file so many written sheets of paper. That is what a New Orleans electrician has invented. Its description is not difficult. When you talk over a telephone the vibrations of your voice send out a series of delicate electric waves. In the new machine a telephone is connected with an electro-magnet, which is excited by the little waves as they travel through it in infinitely rapid succession, and at the same time a long piece of piano wire is drawn past its two poles, very near, but not touching. This magnetizes the wire, but as the magnet itself is continually varying in power, owing to the vibrations, there is a corresponding variation in the effect it produces. That is, the wire is magnetized in different degrees all along its length, as if it were divided into millions of very thin disks, each of a separate magnetic power. These disks are your record.

For reproduction a mild electric current is sent through the magnet, and the same wire is again passed in front of the poles. The irregularly magnetized wire breaks the current into exactly the same kind of waves that were originally sent out from the telephone, and when an ordinary receiver is connected with it you hear a reproduction of the voice just as it is heard over the telephone.



BRIDGE OVER THE FIRTH OF FORTH, SCOTLAND

THIS BRIDGE IS CONSTRUCTED ON THE PRINCIPLE OF THE CANTILEVER BRIDGE AND CONSISTS OF TWO MAIN SPANS OF 1700 FEET. THE TOTAL LENGTH EACH OF THE VIADUCT, INCLUDING PIERS. IS 8296 FEET. IT IS ONE OF THE GREATEST TRIUMPHS OF ENGINEERING SKILL IN MODERN TIMES

Teaching a Child to Speak.

Periods of Development—What Sounds Express—The Child Learning Words and their Meanings—Use of Imitative Words.

PROFESSOR WUNDT, the German psychologist, has published his theory of the development of speech in children. In this development he distinguishes three periods. The first extends over the first five or six weeks of the infant's life, during which it utters only inarticulate vowel sounds or cries. In the beginning these cries always indicate cold, hunger, or sharp pain, but before the end of the first week they are called forth also by slighter causes, such as an uncomfortable position.

In another month the child begins to cry from impatience and weariness, and the first utterance of cries of pleasure dates from the same time. Gradually the cries become more varied and semi-articulate sounds like "ar," "ro," and "ka" are heard. Such sounds form a transition to the second stage of development, that of articulate sounds, which rapidly increase in number and variety. Combinations like "am," "ab," "na," and bu" are used to express a feeling of passive comfort and enjoyment of life.

Keener pleasure finds utterance in a loud crowing sound, which differs from the cry of pain by its higher pitch and shorter duration. There is little further change during the first year. New combinations are added, but they have not the character of words of definite meaning, but are simply expressions of states of feeling like the simple cries that preceded them. The same remark applies to the repeated syllables "ba ba," etc., which usually are developed in the latter half of the first year. These are usually expressive of perfect physical comfort, which seems to produce a sensation of rhythm. About the end of the first year the child usually begins to imitate sounds that it hears, and especially words.

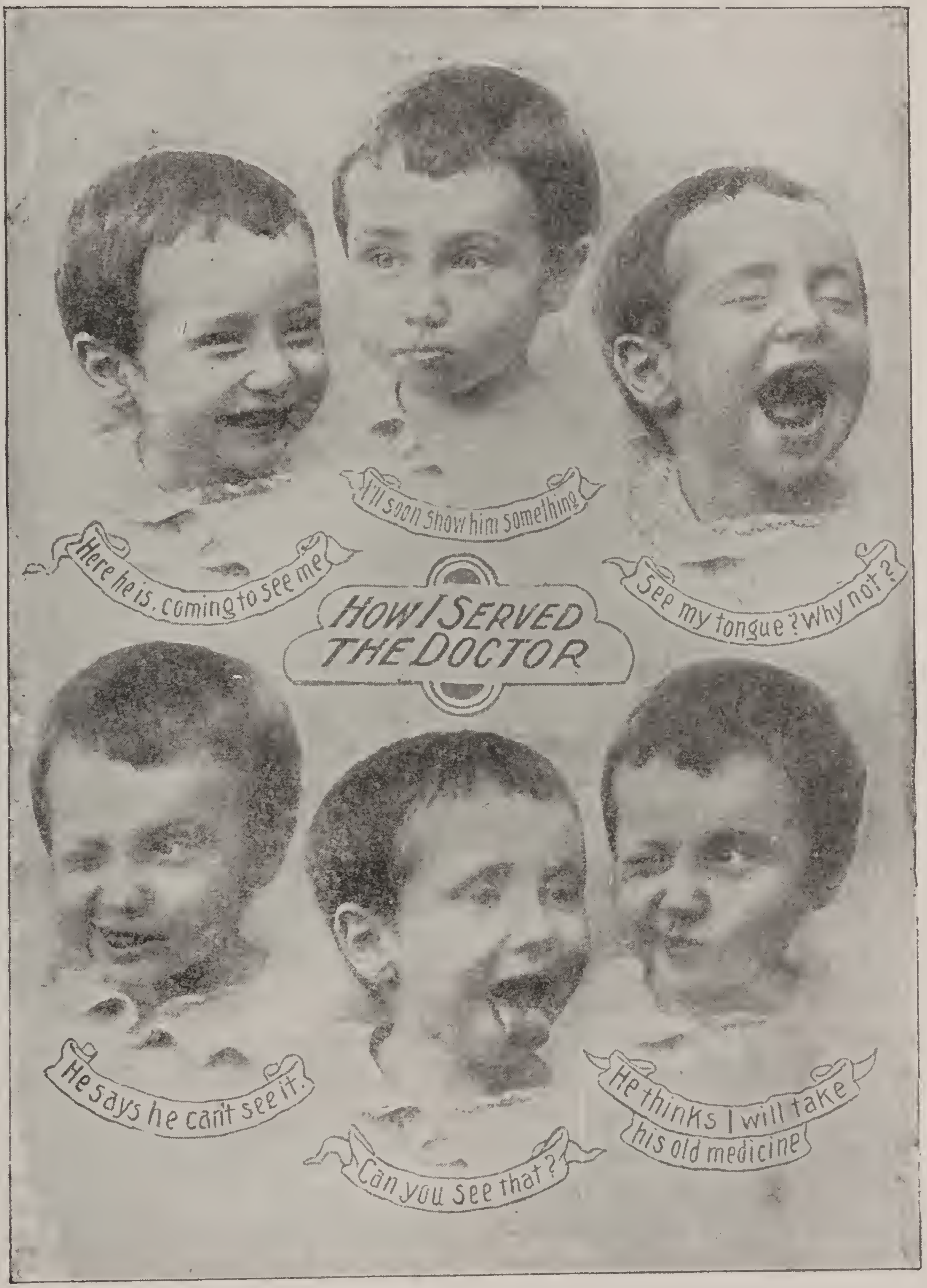
Tendency to Echo.

This tendency to echo sounds varies greatly in different children. At first the sounds are simply repeated without any meaning being attached to them. But the child gradually learns the meaning of words, and soon begins to use them of its own accord to designate objects.

Then it has entered on the third stage, and has become a real student of language. It calls its parents "mamma" and "papa," and has names for all the persons and things of its daily environment. From this point progress is usually very rapid. A girl who first uttered a word, with an understanding of its meaning, in her twelfth month, had acquired sixty-six words in the nineteenth and seventy-eight in the twentieth month.

The speech of a child up to the third year, or later, is full of almost unrecognizable corruptions and of reduplications which correspond with the stage of development of its ideas and form a sort of universal language, for they differ little in different countries. But the use of imitative words like "bow-wow" for a dog varies greatly. Here are a few Japanese words of this sort that are readily intelligible:

"Wan-wan" (dog), "nva-nva" (cat), "ko-ke-kio" (nightingale), "sion-sion" (sparrow), "bun-bun" (bee), "gou-gou" (a large bell), "goro-goro" (thunder), and" fu-fu" (fire).


I'll soon show him something
Here he is, coming to see me
HOW I SERVED THE DOCTOR
See my tongue? Why not?
He says he can't see it.
He thinks I will take his old medicine
Can you see that?

SUGGESTIONS FOR TEACHING CHILDREN FACIAL EXPRESSIONS.

CIVIL SERVICE.

Aim of Civil Service—Examinations, How Conducted—The Causes for Removals—Grading Applicants—Method of Promotion.

BESIDES the hundreds of elective offices there are thousands of positions under the general, state, city and county governments that need efficient men and women for the performance of duties to carry on the government. There are thousands of postmasters, letter-carriers, diplomatic agents, clerks in the various departments at Washington and custom-house officials; similar offices under the state government, in state institutions; in the counties, road builders, poorhouse attendants, etc., and in the cities and towns, the clerks, police, inspectors and others necessary to see that the business of the people is properly done. Employés of the government aside from elective offices are called the civil service.

Time was when all these offices in the different countries were filled with appointments by certain influential heads of government. No sooner was one party out of power than all the adherents to that faction were thrown from office and new hirelings brought up to fill their places. Oftener than otherwise the new appointees had to pay their superiors large premiums to secure the places, and when in turn these superiors fell by the disapproval of the king or people the civil service employés were once more replaced by others.

In the United States there was little abuse of this kind until the administration of President Andrew Jackson, and to him was left the questionable glory of framing the phrase, "To the victor belongs the spoils," which meant that he, at least, intended to remove every one not in accord with his politics and appoint men who would support him at the next election. Since that time and until recently there has been a shameless use of this influence and patronage, and with it a proportionate waste of public funds resultant upon the disregard with which efficient and thorough employés were replaced by ignorant office-hunters. At times but few of the many clerks employed by the federal government were left in office after a presidential election, and many times the post-office department was sorely crippled by the dismissing of thousands of capable men who had learned their work thoroughly, simply to fill the positions with political supporters who in turn would be expelled after the next election.

Public Aroused to Danger.

This abuse reached such a degree that the public realized a great deal of its hard-earned money was going into sink-holes and never coming to light again. In 1883 laws were framed and passed by Congress limiting the power of officials in removing certain officers. Rules were adopted which called for examinations of merit of the different applicants for office. Three commissioners were stipulated by this law to see that its proper regulations were carried out. Application shall be regarded upon merit alone and without regard to political preferences. No person habitually addicted to the use of intoxicants may be appointed to any position, nor may any one receive such appointment unless he or she may have received a standing of 65 per cent in the first three branches examined. The examinations, which are competitive, are generally on the following subjects: (1) Orthography, penmanship and copying; (2) arithmetic—fundamental rules, fractions and per centage; (3) interest, discount and the elements of bookkeeping; (4) elements of the English language, letter-writing and the proper construction of sentences; (5) elements of geography, history and the government of the United States.

SMITHSONIAN INSTITUTE (COLLEGE OF SCIENCES), WASHINGTON, D. C.

Founded 1846 by James Smithson "for the increase and diffusion of knowledge among men." Here are kept all important government documents and relics.

No applicant will be received unless he can furnish proof of his good moral character and is in good health, but any recommendation of any senator or congressman or other official further than as to character will not work to the advancement of the applicant. Women receive as much pay as men in the appointments, and while no one may be appointed without a merit examination, no one may be removed without cause.

This civil service law covers a great many offices, but even to-day there are thousands of positions that should be placed under its protection. In the different states many laws similar in character have been adopted for use in the filling of county, city and state positions. While these laws are abused to a great extent, and elected officials in power evade them grossly, yet they are a step in the right direction toward upbuilding the efficiency of the working government of the whole people and the reduction of expenses.

Qualifications for Examination.

To fully illustrate the workings of the civil service law and what applicants for positions must go through, the following extracts from the civil service law of Illinois practiced in the city of Chicago are given. Under this law more than 11,000 people obtain official positions in the city of Chicago. The law in itself, while not always rightly administered, is pronounced to be one of the best in existence in this country, and corresponds practically with the national law.

"*Citizenship and Residence.*—No person shall be admitted to examination for any position in the Official Service who is not a citizen of the United States, and who has not been an actual resident of the city of Chicago for at least one year next preceding the date of examination.

'*Age.*—Unless otherwise provided in these rules, no person shall be admitted to examination for a position in the Official Service who is less than twenty years of age at the date of examination, except that applicants for positions of pages and messengers must not be less than seventeen years of age at the date of examination.

"*Waiver of Local Residence in Special Examinations.*—In special examinations for any place requiring technical, professional, or scientific knowledge, or manual skill of a high order, the Commission may waive the requirement of residence in the city of Chicago, fixed in Section 1 of this rule.

"*Application, How Made.*—Application for admission to examination shall be made on blanks in such form and manner and supported by such certificates of persons acquainted with the applicant as the Commission may prescribe. These blanks will be furnished directly to applicants for examination.

No Religious Prejudice.

"*Political or Religious Opinion Not to Influence Appointments.*—No question in any examination shall relate to political or religious opinions of affiliations, and no appointment or selection to an office, or for employment within the scope of these rules, shall be in any manner affected or influenced by such opinions or affiliations.

"*Place, Time and Notice of Examinations.*—Examinations shall be held at such times and places as the Commission may designate, and two weeks' notice thereof shall be given, as provided by law.

"*Subjects of Examination.*—The subjects of examination shall be designated from time to time by the Commission, and shall be such as the needs of the service require and such as tend to prove the qualifications of the applicant for the office sought, and may include special tests of fitness for any particular place requiring technical, professional or scientific knowledge, or manual skill.

"*How Graded.*—Proficiency in any subject shall be credited in grading the standing of the person examined, in proportion to a value of a knowledge of such a subject in the branch or part of the service which the applicant seeks to enter, and of physical qualifications and health. The relative weight of each subject shall be fixed by the Commission for every examination.

"*Must Obtain Seventy Per Cent.*—The name of no person shall be entered on a register of eligibles whose standing, upon a just grading in the examination, shall average less than 70 per centum of complete proficiency in the subjects of the examination, taken as a whole, and of such minimum mark as may be fixed by the Commission for any part thereof.

"*Method of Examination and Marking.*—All questions used in any examination shall be first approved by the Commission. All examinations shall be conducted under the supervision of, and examination papers shall be marked under the regulation of, the Commission. The same series of examination papers shall not be used a second time. No examina-

THE GOVERNMENT BACTERIOLOGICAL BUREAU.

On Halsted Street near the stockyards, Chicago, where several hundred young women make microscopical examinations of the slaughtered cattle.

tion papers and no examinations shall be subject to review by the Civil Service Commission or any of its members after posting of the eligible lists.

How Enrolled.

"*Method of Enrollment.* — All competitors who attain a general average of 70 per centum or over (and of such minimum mark as may be fixed by the Commission for any part thereof) shall be eligible for appointment to the place for which they were examined, and their names shall be enrolled in the order of general average upon the proper registers which shall be in such form as the Commission shall prescribe, and shall be called 'Registers of Eligibles.'

"*Time of Remaining on Registers of Eligibles.*—Names shall remain upon the registers of eligibles for two years from the date of their enrollment, unless sooner removed under authority contained in these rules or by appointment. At the expiration of one year the eligible shall, upon a form prescribed by the Commission, furnish new certificates of character.

"*Method of Promotion.*—All promotion in the classified service, unless herein otherwise provided, shall be from grade to grade, and shall be made upon voluntary, open, competitive examination. Competition in such examinations shall be limited to the employés in the next lower grade of the same division serving in the department in which the position exists, unless the Commission shall deem it for the interest of the service to admit competitive employés in other grades or other divisions serving in that or other departments.

"*Cause for Removal; Charges, How Made.*—Section 12 of said act provides that no officer or employé in the classified service who shall have been appointed under these rules and after examination shall be removed or discharged except for cause, upon written charges, and after an opportunity to be heard in his own defense. When a removal is deemed necessary, the appointing officer shall immediately notify the Commission in writing of the grounds therefor. Such grounds shall be investigated by the Commission, and the accused person shall be given an opportunity to be heard in his own defense, provided, however, that such officer or employé file a written statement requesting an investigation within three (3) days after the date of his separation. The finding and decision of the Commission shall be certified to the appointing officer, and shall be forthwith enforced by said officer. Pending such investigation, the appointing officer may suspend the accused for a reasonable period, not exceeding thirty days. Nothing in this section shall be construed to require such charges or investigation in cases of laborers or persons who have the custody of public money, for the safekeeping of which another person has given bonds."

RULES FOR A YOUNG MAN'S SUCCESS.

Good Character Necessary—Mental Training Essential—Effects of Dissipation—Caution Against Overwork—Physical Exercise Recommended.

IT has been said that success is mental, moral and spiritual. Most writers who have discussed this vital topic have raised it above a mere sordid interpretation, above the material into the realm of spirit and intellect. One writer says that every truly successful life must necessarily be self-sustaining, and in fact ought to have something more than only the means of livelihood; while, on the other hand, another maintains that success may exist amid the environments of indigence.

If we accept the first definition with the financial clause, we shall certainly come nearer the opinion of the majority of people, since we are living in an age when money-getting is rampant, and therefore it would be inappropriate to omit the consideration of finances. This same authority places character above all other requisites. He says:

"Bodily vigor is good, and vigor of intellect is even better, but far above both is character. It is true, of course, that a genius may in certain lines do more than a brave and manly fellow who is not a genius; and so in sports vast physical strength may overcome weakness, even if the puny body have in it the heart of a lion. But in the long run, in the great battle of life, no brilliancy of intellect, no perfection of bodily development will count where weighed in the balance against that assemblage of virtues, active and passive, which we group together under the name of character."

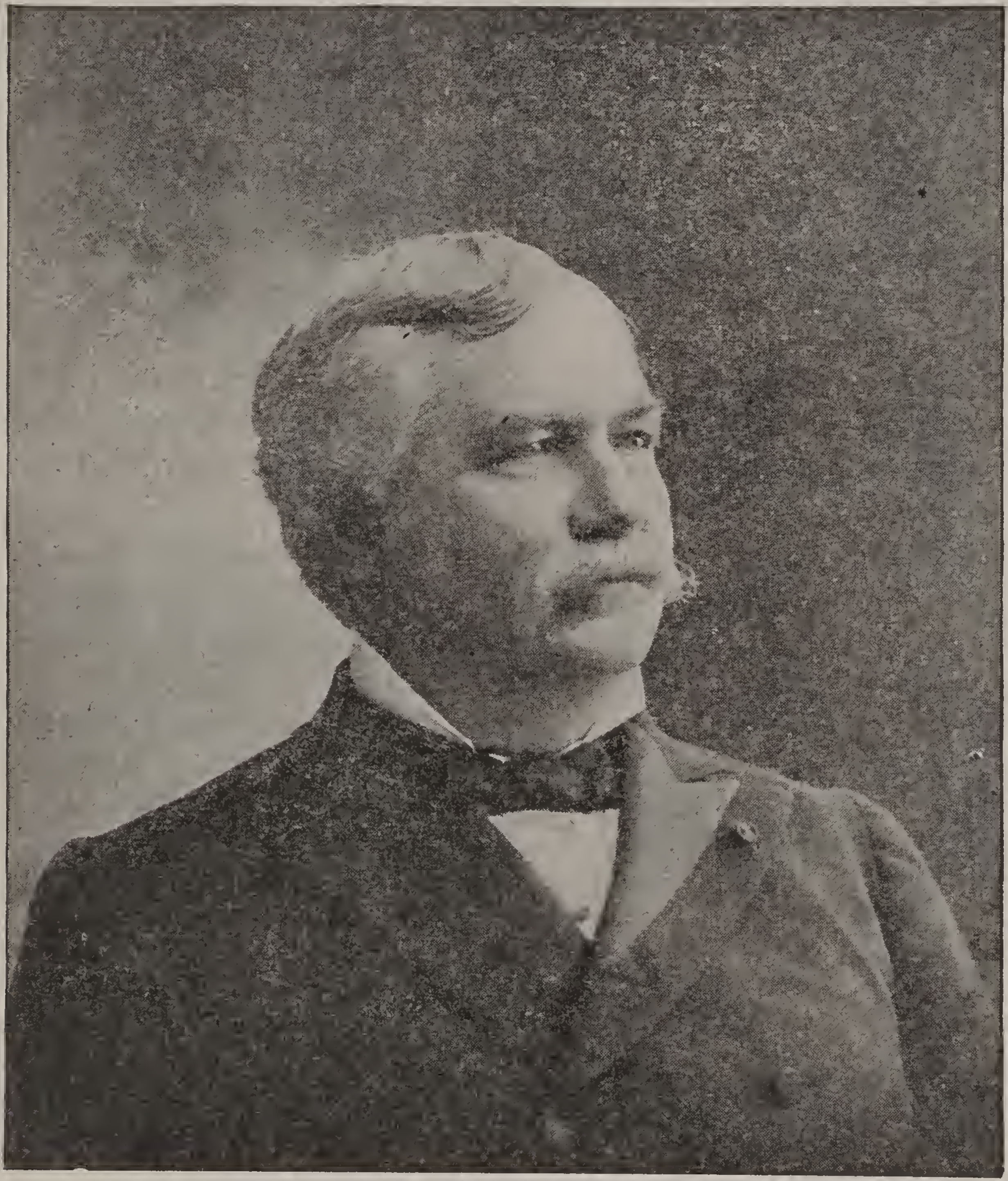
Kinds of Character.

Perhaps this observation would have been truer if the author had said "good character," for character may be either good or evil, since it is only another name for the personality of men—and men are both good and evil. Shylock had plenty of character. It obtruded, so positive was it; but it was the wrong sort. It was evil. Considering the matter of material success, opportunity and possibility deeply absorb the attention of the ambitious young man, and for him one writer has these encouraging words:

"The average young man into whom the average boy develops is, of course, not going to be a marvel in any line, but if he only chooses to try he can be very good in any line, and the chances of his doing good work are immensely increased if he has trained his mind."

In this age there is no excuse for ignorance. We are so abundantly supplied with means of education—within the reach of all—that it is the question nowadays, "What shall I not study?" not, "What shall I study?" Your successful elder will tell you to be patient and industrious, and to work hard, but that unaccompanied by intelligence—the trained mind—will not bring success; although all those are very necessary.

A mule is patient, industrious and hard-working, and he has been properly named an "ass." Given the opportunity, then, to be "very good in any line," the first and continual step of the young man—for successful men are always learning—should be the training of his intellect. If a college or university education be beyond his reach, he may follow in the footsteps of Lincoln, who learned more by himself than any school could have taught him. The chief value of our schools is that they establish mental discipline and studious habits, rather than that they deal directly with the practical affairs of life; although their present tendency is in that direction, as our manual training, domestic science and business schools attest.



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HON. D. B. HENDERSON.

Speaker of the House of Representatives.

The next logical step is the choice of a profession, and there many mistakes are made, for the young man usually examines the field with regard to its value alone, and not with regard to its value to him. "Is it a good business?" is the question, not, "Is it a good business for me?" No man can succeed in a work which is distasteful to him.

Qualities Necessary.

Having intelligence and the choice of a profession assured, it is thoroughly agreed among successful men that reliability is the next consideration, and next in importance is resolution and perseverance.

"Perhaps there is no more important component of character than steadfast resolution," writes one.

And another:

"The unreliable man is a public nuisance."

And again:

"One must be systematic, assiduous and painstaking in the prosecution of his enterprises, and must cultivate the good opinion of his fellows."

And:

"Chief among the causes which bring positive failures is vacillation."

A noted pugilist once put a philosophy into these words:

"Any man who can't take a punch had better not get inside the ropes."

It is the ability to take the "punches" of experience and get on his feet a little wiser, that grim determination to surmount insuperable difficulties which characterized Grant when he said: "I'll fight it out on this line if it takes all summer," the "staying power": these are the emblems of that irresistible force we call determination.

Most young men have an idea that it is permissible to "sow wild oats." Such a fallacy should be instantly dismissed. Dissipation has three serious effects in a young man's life. Naturally the most important of these is the attitude of the prospective employer toward it. An applicant who shows signs of indulging in liquor or other vices has no chance against him who is morally clean. The cigarette has been black-mailed by many large firms.

Further, the effect of dissipation upon the physical and mental power is disastrous. Who has not read in the lack-luster eye of the dissolute the feeble mind and inert body. The third is what has been called the "spiritual" effect, and there can be no doubt that the spiritual nature is deadened by neglect.

Evils of Overwork.

A serious error among the youth of to-day may exist in overwork. A successful financier once wrote: "Overwork is worse than no work," and he was right. The ambitious young man should take the measure of his capacity for work carefully, and never overtax it. Another sees a national danger line. He says:

"For the only danger before capable young Americans, and, indeed, before our nation, is that of hurrying too much, of sweeping on too rapidly, of straining every nerve too tensely, of living our lives too strenuously. What most young men of this country need is restraint, not stimulant. What this nation needs is reserve. The only serious fear I entertain is that the rapidity of our lives will make us neurotic and decadent."

THE BEST EXAMPLE OF INDUSTRY.

An apiary or bee farm in California where honey is produced by scientific cultivation of bees.

Here should be emphasized the value of physical exercise. Young men do not seem to realize that brain power relies upon physical strength. It is the foundation of all activity. True, some great men like Byron were weak physically, but bright minds over weak bodies usually result in early death, as was the case with Byron.

George Washington was the best wrestler in northern Virginia, and Lincoln, in spite of his spare build, was a powerful man. It is the physical reserve that carries great men through crises. So every young man should be as careful in training his body as he is in his mental and moral attributes. To sum up, then, any set of rules for the guidance of young men aiming for success ought to include:

Mental training,
Honesty,
Reliability,
Perseverance,
Morality,
Caution against overwork,
Physical culture.

This will, if properly followed, insure a symmetrical development mentally, morally and physically. And in addition to this the spiritual life must not be neglected. Church work of any sort is a source of power, and is very pleasurable. In conclusion, these words of a prominent public man will be appropriate:

"There is just one lesson these ancient ruins (of Nippur) teach, and that is the nothingness of fame, and that the only real things in life are love and duty. I cannot think of any blessing so great to an ardent young American as to learn on the very threshold of his career of activities that duty and affection are the only things really worth his while—the only things that pay increasing dividends and never become bankrupt."

The Most Expensive City in the World.

New York's Annual Expenses Compared with those of Other Cities—Sources of Revenue—The Sinking Fund, Annual Receipts.

THE annual expenditures of the city of New York are greater than those of any other city in the world. The gross budget of the city for 1899 was $20,000,000 greater than the expenses of London, $18,000,000 in excess of the budget of Paris, and only $1,000,000 less than the combined expenditures of Boston, Chicago and Philadelphia. The expenses of the city for 1899, for local purposes only, amounted to $19.56 per capita of an estimated population of 3,500,000.

On January 1, 1900, the gross accepted debt of New York City was $358,104,307.11, against which there was a sinking fund of $105,435,871.70, leaving a net funded debt of $252,668,435.41. The city of Paris, with smaller available resources than New York City, has a debt in excess of $500,000,000. The gross expenditures of the city during 1899, not including permanent improvements, paid from the proceeds of bonds were $93,520,082.03.

The total receipts of the city for the same period, from all sources and for all purposes, according to Bird S. Coler, the city comptroller, were approximately $108,000,000. The income was derived from three general sources, taxation yielding $84,000,000. The budget, which represents the money to be raised by taxation, was reduced $9,000,000 by income known as the general fund. The chief items of this were:

Excise taxes	$3,600,000.00
School money from the state	1,280,883.45
Fees of various county and city offices	246,576.65
Interest on taxes and assessments	979,185.35
Unexpended appropriations	1,356,786.57

The gradual reduction of the city debt, except as it is maintained or increased by additional bond issues, is provided for by an increasing and protected sinking fund. In 1899 the total receipts of this fund were $15,601,492.50. The Croton water rents, which amounted to $4,590,502.55 in 1899, are applied to this fund, as well as the dock and slip rents of $2,362,421.14.

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HON. SETH LOW.

Prominent politician and President of Columbia College, New York.

Among the other chief items of this fund are:

Revenue from investments	$3,573,519.34
Ferry rents	370,776.00
Market rents	251,500.00
Interest on deposits	520,526.00
Installments included in the budget	2,633,110.00

More than $1,000,000 is derived annually from miscellaneous sources.

The budget of the city for 1900 is $90,778,972.48. It will be interesting to compare these figures with the expenditures of other cities. The approximate current expenses of London in 1899 were $73,000,000; of Paris, $75,000,000; of Berlin, $23,347,600; of Boston, $35,454,588; of Chicago, $32,034,008; of Philadelphia, $27,075,014. This comparison shows that New York City is the most expensive city in the world.

NAVY YARDS OF AMERICA.

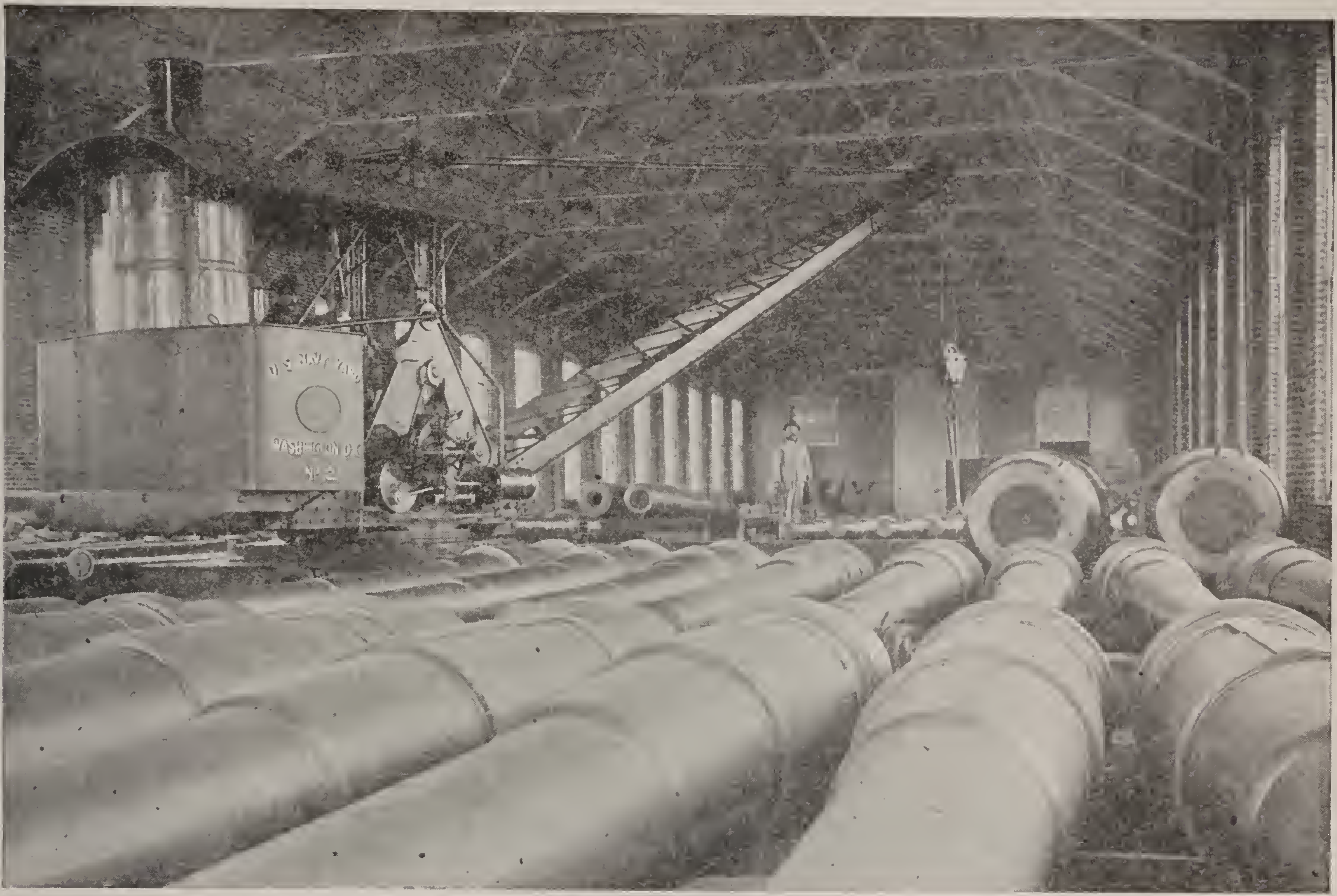
Birthplace of America's Great Battleships—Their Manner of Construction—Origin of the Kearsarge—Where the Oregon Came from—The Illinois Now Under Way.

ON the Long Island side of the East River, between the Brooklyn bridge and the Williamsburg ferries, is located the famous Brooklyn Navy Yard, the home of the North Atlantic fleet. The place first became famous during the revolutionary days when the British prison ship Jersey was anchored in the harbor with its thousands of American prisoners.

The first sight presented to a visitor in the yards is a park of guns. Here are Mexican mortars, Confederate howitzers and other trophies that mark the prowess of sailors. The offices and storehouse, like a little town in themselves, present the next busy scene. Then comes a host of boiler shops, machine shops, blacksmith shops, foundries and many other buildings in which the myriad parts of the floating forts are manufactured. Occasionally Uncle Sam builds his warships entirely, as in the case of the ill-fated Maine and the Texas.

These yards excel in dry docks, repair shops, coaling stations and in facilities for overhauling vessels. Every conceivable ship from a monster of 10,000 tons to the minute torpedo boat, although the latter type is not a feature in the construction of the new navy, may be seen there.

On the Pacific coast the great navy yard is at Mare Island, where the coast defense vessel, the Monterey, was outfitted. Mare Island is a short distance from the city of San Francisco, and is finely equipped for the needs of our navy. Another ship-



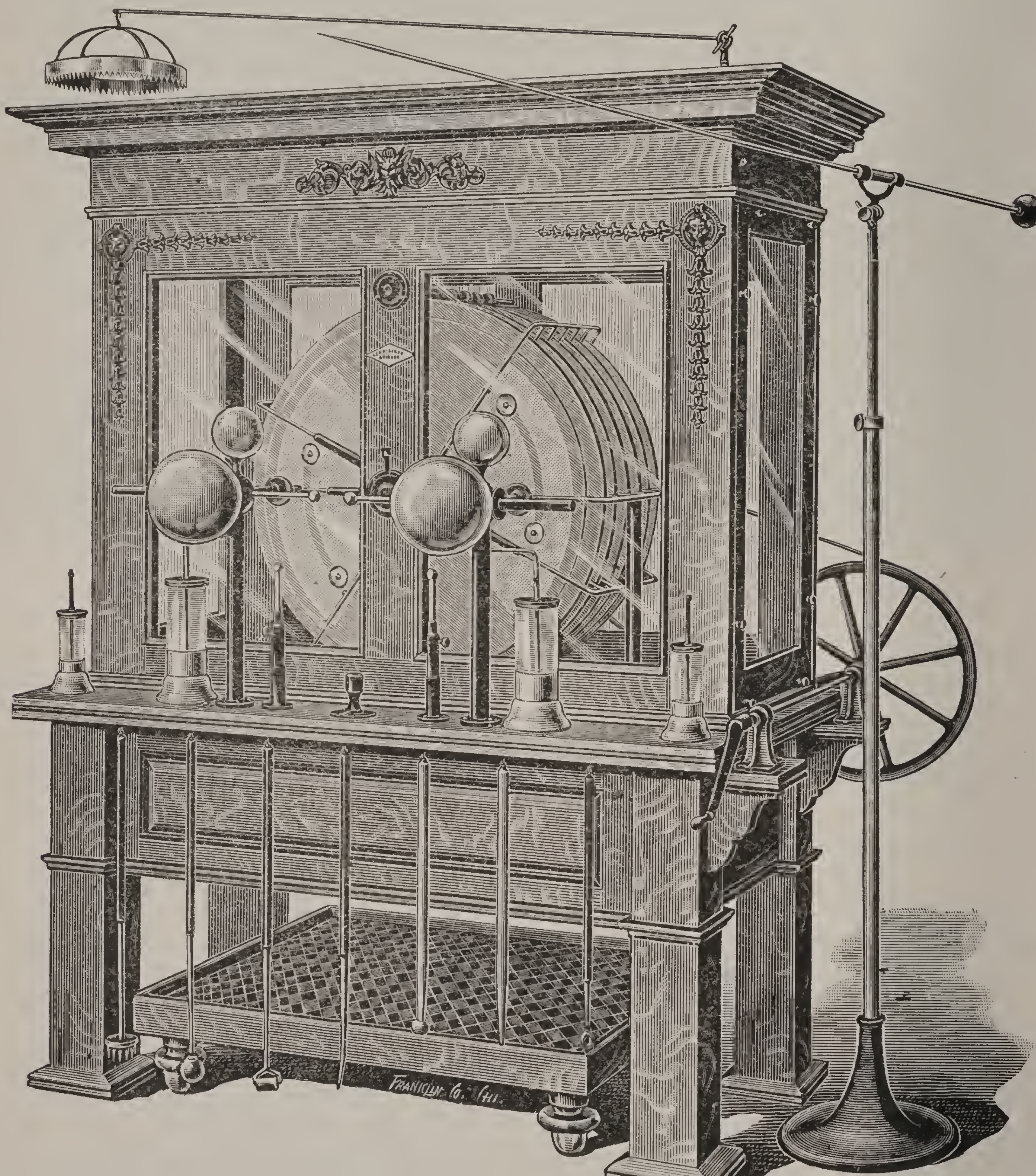
A GIANT WALKING CRANE HAULING GUN BARRELS.
At the Washington Navy Yard. This Crane travels on an elevated track.

building yards is at Newport News, Virginia. The Kearsarge, the Kentucky and the Illinois were built here. Uncle Sam is not as well equipped with large naval establishments as he needs to be, but there is an indication that Congress intends to remedy this defect at an early date.

STATIC ELECTRIC MACHINE.

Transmitting Electricity to the Human Body—Form of Electricity—Its Effects—A Harmless Stimulant.

THIS is a static electricity machine invented and constructed for the purpose of transferring frictional electricity to the human body without harm. In the illustration the machine is shown as operated by a hand wheel, but they are also run by small electric batteries. When the machine is in full operation frictional electricity is developed and passed to the human body in the form of vibrations instead of a direct shock. The mode of transmission is either through the cap in the illustration, which looks like the spray of a bath tub, and which is suspended over the head, or by means of handles which the patient grasps. The effect of the static electricity passing through the body is to stimulate the circulation, restore the nervous energy and increase the amount of reserve strength. It is a healthful and pleasant treatment for persons with weak nerves and torpid livers. So far as its effect on the system is concerned, it is harmless.


FRANKLIN CO. CHI.

A STATIC ELECTRIC MACHINE.

The purpose of this machine is the transmission of vibratory, frictional electricity to the human body, without a direct shock. Transmission is made by means of the crown suspended over the head, the pointed rod, or by handles.

CRIMINAL AND CIVIL LAW.

What Criminal Law Provides—Dueling a Crime—Division of Law—When Martial Law is in Effect.

IGNORANCE of the law is no excuse.

You cannot lawfully condone an offense by receiving back stolen property.

The police are not authorized to make arrests without warrants unless they personally know of the offense for which they may be made.

The adage that "Every man's house is his castle" does not apply when the man is accused of crime and a warrant is sworn out against him.

Embezzlement can be charged only against an officer, agent, clerk or servant of a corporation.

Petit larceny is when the property involved is less than $25; grand larceny when over that amount.

The crime of arson must have been committed at night and when the buildings were inhabited.

Drunkenness is not a legal excuse for crime, but when it has gone to the extent of delirium tremens it is often held as insanity.

A female is not exempt from arrest except in civil cases; criminal matters make her liable.

When a sheriff appeals for assistance every man is in law bound to obey the call.

Criminal Carelessness.

Criminal carelessness is a crime, but accident is not. If, through carelessness an elevator falls and kills passengers, the owner and operator may be liable criminally. But if a man is shooting at a burglar and accidentally kills a member of his own family it is not a crime.

Murder to be in the first degree is—must be premeditated, malicious, willful and committed while the murderer is engaged in a felonous act. Dueling is a misdemeanor, as is a challenge to such combat; and killing in duel is murder.

False swearing to be perjury must be willfully done. If a man says that "he believes such to be the case," or that "to the best of his ability such is the case," it is not perjury if the facts are falsely stated. A false statement must be absolute. Subornation of perjury is a felony.

A felony is a high crime; the highest of the principal classes into which crimes are divided by statute; a grave crime exceeding the grade of a misdemeanor.

Forgery is a copying or signing the name of another to any document, with intent to deceive or defraud.

An "offer or attempt at assault" is all that need be proved to show a case of assault. Battery presumes bodily violence.

Bigamy cannot be proved at law when one of the parties to the marriage has been absent and not heard from for five years.

Civil Law.

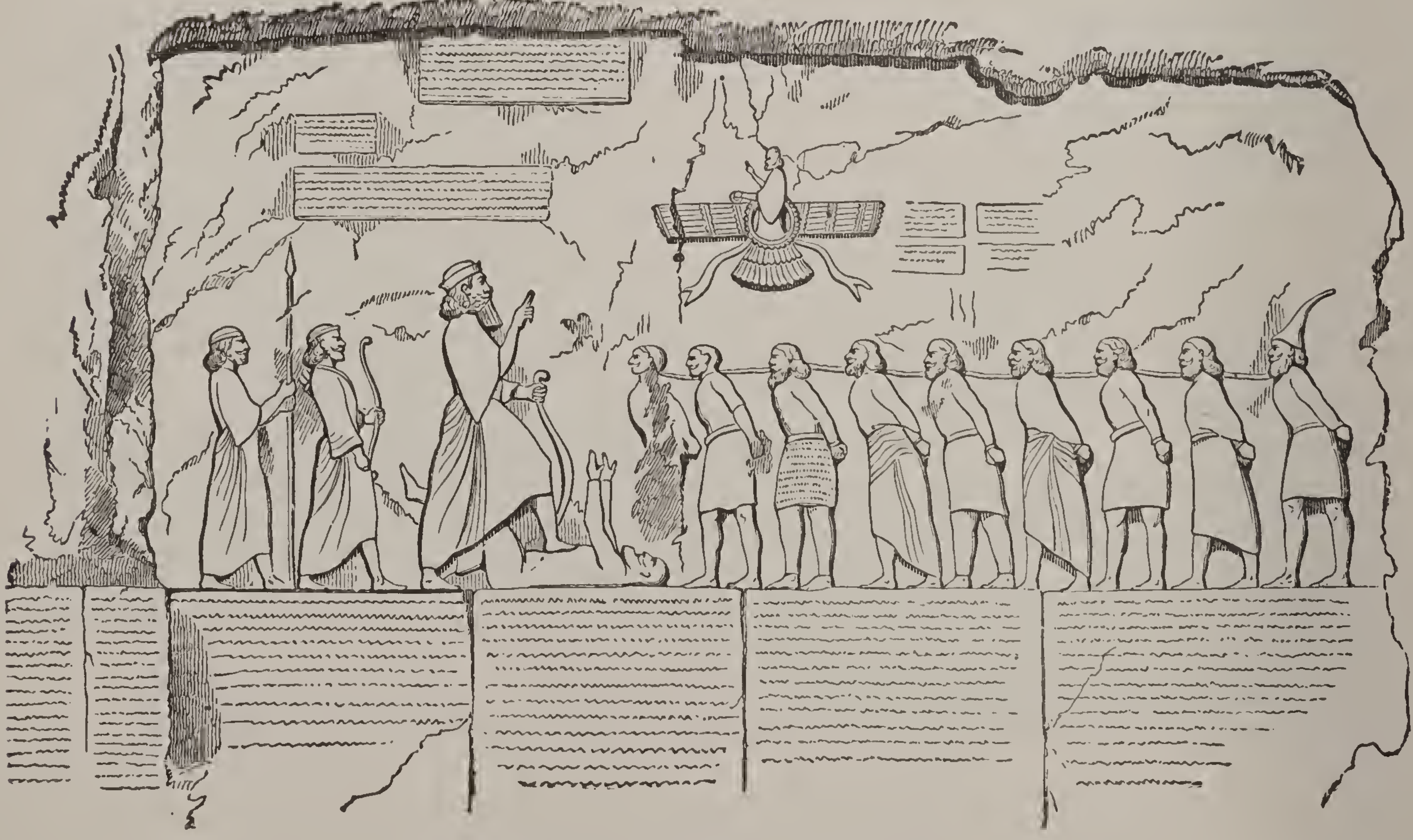
Civil law is a rule of action established by the recognized authority of the state or government to enforce justice and direct duty. All law is divided into the following:

LAW.

- Between God and Man
  - Natural
  - Revealed
- Between Man and Man
  - *National* or *Municipal*
    - Constitutional Law
    - Cannon or Ecclesiastical
    - *Equity* and *Common Law*
      - Public or Criminal
      - Private or Civil
  - *International.*

Civil law is that system of jurisprudence which the people of any State or nation establish for their government as citizens. It particularly relates to all not connected with the criminal. It covers indebtedness, actions on notes and mortgages, actions in trespass, to quiet title to property, to adjust titles, to collect money, to recover damages, to secure divorce and kindred suits.

Commercial law is a branch of the civil law relating to legal proceedings in connection with commercial houses. Maritime law relates to questions pertaining to affairs of the sea. Martial law is in effect when the civil authorities are superseded by the military authorities. Military law is that relating to the army. Municipal laws relate to those of the city. The Roman law is that formerly administered by the government of Rome. The laws of Napoleon are those laid down by the first Napoleon of France. Sumptuary laws are those regulating the traffic in intoxicating liquors.



ANCIENT JEWISH CAPTIVES

TRUSTS AND COMBINATIONS.

Origin of Trusts—Necessity for Combination of Capital—Difference Between Monopoly and Trust—Some Court Rulings.

THE progress of civilization has led to combinations of capital and the centralization of control. The signs of this are no better shown than in the desire of people to seek places of dwelling in large cities. While the tendency of private business houses for many years has been toward combination, not until 1898 did people begin to look at the so-called trust, or combination, as a thing to be shattered and blown to the four winds.

The first element which is the inducement for forming combinations is the limitation of the liability of the parties involved. The second is the perpetuity of the business and the fact that, unlike a partnership, the company does not dissolve upon the death or removal of one or more of its members. Many business houses have been converted into private companies which possess the advantages already mentioned but which do not properly belong to combinations.

A general depression of business and a falling off in the profits of the ordinary business, forced men to look around for means by which expenses could be curtailed. When every method of reducing expenses had been exhausted, it became compulsory to seek additional ways to make both ends meet. After some little experimenting it was discovered that several competing firms, by uniting in the distribution of products and arrangement of price and the adjustment of credit, could raise the profits.

These arrangements were first called "pools." As they were merely verbal agreements, they were often violated in secret for no other reason than because no binding contracts had been drawn among the firms in the understanding. The outcome of this led to the formation of many concerns under one central control, and these were nothing less than combinations.

Origin of Monopolies.

A monopoly, so called and often confused with the terms "trust" and "combination," was originally a grant or license by the crown to a subject for the exclusive privilege of buying or selling, making, working or using anything. In the course of time the term monopoly has come to be used in relation to any natural or economic condition wherein a particular trade, industry or occupation is under the control of a few persons. Properly speaking, the term has no place in current discussion of trusts and combinations. It is used because three centuries ago it became so obnoxious to the English-speaking people that it serves to arouse prejudice to call anything objectionable a monopoly.

A trust, as interpreted in the year of 1900 is a combination of corporations formed by the creation of a trust, wherein stockholders of the several corporations deposit their stock with trustees, receiving in return receipts in the form of trust certificates; the control of the several corporations being vested in the trustees, who thereby formed one central body.

In 1899 when the courts decided, in the North River Sugar Refinery case, that it was illegal for corporations to turn over to a body of trustees the control of their affairs this form of combination has virtually been abandoned. It will be seen, therefore, that as the term "monopoly" is irrelevant when commonly used to express the meaning of a combination, so also is the term "trust." Nevertheless both these terms are used and present indications are that they will be used for some time to come. When any one of the three expressions is used, therefore, in most cases it will be discovered that the combination form is referred to.

Commodore Vanderbilt, Wealth, $100,000,000, Father.

Wm. H. Vanderbilt, Wealth, $200,000,000, Son.

Cornelius Vanderbilt, Wealth, $100,000,000, Grandson.

Alfred Vanderbilt, Wealth, $150,000,000, Gt. Grandson

THE VANDERBILT MEN.

The four generations since the founding of the family.

Watering Stock.

There are combinations doing good to the community, and there are others which can be called nothing short of "pirates." In the latter case the prime evil is that of watered stock. This came about at first through the necessity of rewarding the promoter, or the man who was responsible for bringing about the formation of the combination. Watered stock is simply the issuing of engraved paper which represents no assets. It has no reserve to back it up, pays practically no dividend, and for this reason is worthless except to be used by speculators for such purposes.

Many combinations have been formed for no other purpose than to be put upon the Wall Street market and made the basis for speculation. So frequently has this class of stocks made its appearance that they have finally come to be called "gambling industrials," and no financier with any shrewdness could be prevailed upon to waste his money in purchasing them.

The combination based on integrity that can be relied on to do what is fair is a blessing. Combination, which rightly interpreted is co-operation, must be the foundation of every honestly conducted trust. Industrial combinations must be conducted on an industrial basis which means several things. First, a fair reward to the wage earner; second, the roduction of the best article at the low-st price; third, honest dividends to onorable stockholders, and fourth, an onest board of directors.

Legality of Combinations.

The test of the legality of a combina-ion is its object. Every combination rganized to do anything contrary to law s illegal, regardless of its size or the form f its construction. On the other hand if he object of the combination be within he confines of the law neither size or form ill render it illegal.

If a combination is formed for the pur-ose of controlling prices, production or ompetition, then it is illegal. The object f all laws and decisions against combina-ions to control production, prices or com-etition is to protect the community gainst the maintenance of prices at levels igher than they would be if competition ere unrestricted and production and rices uncontrolled. The main interest of ie public is in the price it has to pay for ny article, and the popular outcry against ionopolies, trusts and combinations is ased entirely upon the assumption that iey all compel the public to pay higher rices for whatever is controlled. In iany States there are laws against combi-ations of any sort, and for this reason ne or two States, such for instance as ew Jersey, are made the main places where combinations are organized and incorporated.

There are many combinations of labor, formed for the purpose of advancing the condition of the laboring man. These are all considered legal though some of them really act as restrictions on employers. It is said that some labor leaders who are far-sighted have discovered that it is mainly with large combinations of capital that equally large combinations of labor can deal with certainty of permanent result. In 1890 Congress passed a federal anti-trust act making it a criminal offense for two or more persons to agree to combine in any manner to restrain or monopolize, in part or in whole, interstate commerce.

Each State has the power to prescribe terms and conditions upon which corporations can be created under its own laws, and, what is vastly more important, each State has the power to prescribe the terms and conditions upon which it will permit the corporations of other States to do business within its borders. If the State sees fit the corporation may be excluded from its territory. They may be crudely organized and may frequently abuse their powers, but beyond the prevention of the abuses legislative interference with combinations appears to be diminishing each year. The province of the law is to restrict evil and to conserve the good.

POLITICAL ORGANIZATIONS.

Birth of Tammany Hall—Its Large Field of Labor—A Powerful Organization—Othe Organizations and Their Leaders.

NO United States President, or governor or mayor of any city, is elected to office without the aid of a party organization. The head of the organization may not hold an office paying a salary. He may never have held office requiring the payment of a salary from public funds, but this does not affect his power.

Republicans and Democrats alike, in the United States, have organizations perfected to the last detail. It may be a national or only a ward organization, but whatever it chances to be it is so arranged that it works without friction, and can, for the most part, be relied on to deliver to the polls a certain number of votes.

Often one man holds the reins over a political organization. When this state of affairs exists it is called a one-man power. It is almost incalculable the amount of influence wielded by certain politicians who live solely to run an organization of this sort.

In America the most perfect organization in politics is Tammany Hall. Some people say that nowhere is there so remarkable an organization of the kind. This organization, which controls absolutely one hundred and ten of the one hundred and eighty thousand Democratic voters of the city of New York, is under the thumb of Richard Croker. What he says is final.

Croker, All-Powerful.

No man or number of men in th organization have ever been able to su cessfully stand against the will of th most powerful leader Tammany Hall ha known. So wonderful is the mechanis of this "tribe," as it is sometimes calle that were it necessary every one of th voters under its control could be reache without the assistance of a newspaper any sort of advertisement, within a fe hours.

There might be a strong wave of po ular sentiment against one or more of th candidates offered by Tammany Hal There might be a principle involved tha would cause the bitter antagonism of th majority of the so-called respectable cit zens, but this would produce little effec upon the leader of the "braves" or hi followers.

The only post ever held by Richar Croker was that of chairman of the co mittee on finances. This position he ap pointed himself to fill, and from it authority he has directed the forces tha for years have resulted in the securing o a monopoly on the administration of Ne York City's affairs.

In 1900 the tower of Richard Croke after having once announced his with drawal from the leadership, was greate than ever before. John F. Carroll i deputy leader of Tammany Hall. Whe

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RICHARD CROKER.

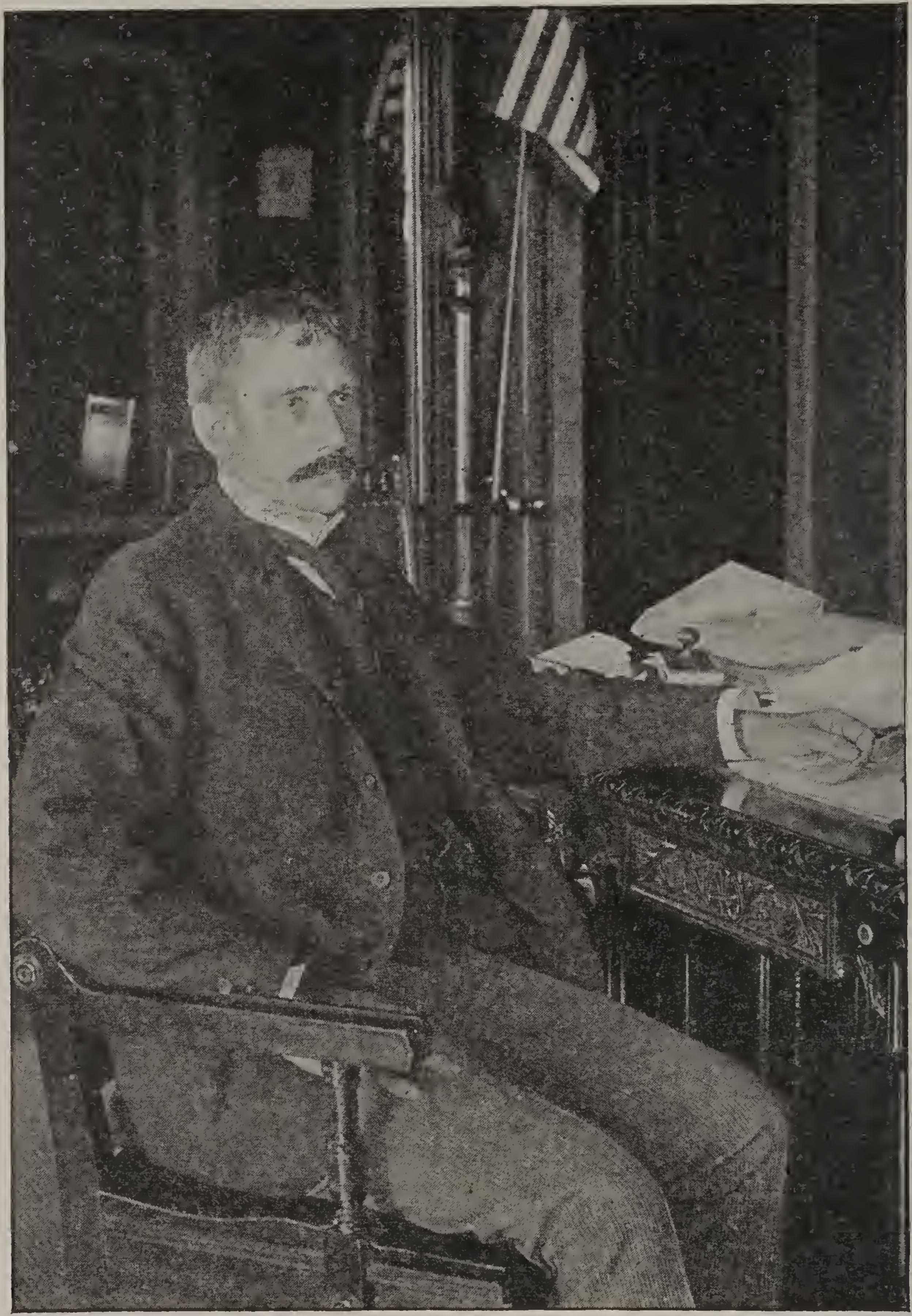
Well-known Democratic leader.

the "Boss," as Croker is called, is away Carroll wields the scepter of authority, and no one thinks of opposing his dictations.

Character of Tammany.

The Tammany organization, or the Democratic-Republican organization of the city and county of New York, as it is known officially, is composed of the Tammany general committee, in turn made up of some four thousand members elected from the various districts.

As New York county is divided into thirty-five Assembly districts corresponding to the wards in other cities, there are this number of leaders known as district



ELIHU ROOT.
Secretary of War.

leaders. These men are at the beck and call of the head of the organization.

Each assembly district has a representative of from two to eight hundred members in the general committee, and these members are regularly elected in the primaries. A member of the general committee in each district is elected to a place on the executive committee. The executive committee supposedly runs the machine, but in reality all that it does in the way of official duties is to approve the selections or appointments made by the "Boss," whoever he may be.

The name "Tiger" is sometimes given this powerful organization. It comes from the Tammany Society, and in connection with it there is a tradition that

STEPHEN B. ELKINS.

Chief Tammany once made a speech during which he addressed fifteen Indian tribes, and that the chief gave to each the name of an animal to be taken as a symbol of the tribe. Originally the eagle, the symbol of the first tribe, then in New York State, was taken, but before 1870 the eagle had been replaced by the tiger, the former symbol of Delaware.

Tammany Hall, while doing most of its work among and through the influence of the Democrats, really does not represent a political party, for it is conducted on principles nothing more or less than those of any well-systematized business. The men in the Tammany organization are in politics for what they can get out of it, and they are all willing to admit that fact.

Age of Tammany.

Tammany Hall has been in existence since before 1800. While in 1900 there were signs which indicated that it might

SENATOR HENRY CABOT LODGE OF MASSACHUSETTS.

go down to destruction before many years of the twentieth century had passed, the power displayed in the nominations of 1900 by these "braves" of New York was astounding.

One of the secrets of Tammany's success is that the district leaders are never interfered with in matters relating to the district alone. This unwritten law has caused more than one man, who attempted to violate it, to realize that it was made to stand the test of time. Another reason for Tammany's steady march in the direction of financial reward is the pains taken to provide for all in any way related to the organization who stand in need of assistance.

Twenty-nine of the thirty-five district leaders hold public offices paying salaries ranging from four to eight thousand dollars a year. The other six are merely out of office temporarily, and are amply repaid for any waiting they may have to endure for the benefit of the organization as a whole. There is plenty to do for the Tammany district leader, even though he may not be busy with the duties of public office.

The followers of Tammany must be kept in line and cared for if they require money to tide them over a temporary period of financial distress. This requires the almost incessant working of the district leader and his precinct captains, who are never through with their work. No person on the Tammany "rolls" ever gets out of sight of the organization workers. While the bulk of the work done is among the poorer element, the well-to-do and even some of the wealthy come under the influence of the "Tiger."

The relative of a voter who can control a few votes besides his own can always secure a position through Tammany. The widow who is in need, if her case be worthy, never looks in vain for relief if the precinct captain is within reach. Men who get into trouble resulting in their being arrested are released from confinement on bonds provided by Tammany money. The precinct captain may be called out of bed in the middle of the night to do some favor for one or more of Tammany's dependents, but he does not complain, for here is where his power lays when it is necessary to obtain votes at the proper time.

Losing Power.

The abolition of the "saloon boss" through the introduction in 1895 of the secret ballot and the civil-service reform introduced about that time, have robbed Tammany of much of the power it formerly had. As a result the men in positions paying good salaries, who, as hold-overs, are exempt from taking the examination they surely could not pass, have grown lazy, and many have refused to do the work necessary before and during election times to bring a victory.

Rumors which have been afloat since 1898 to the effect that charges and counter charges have been going back and forth inside the "Wigwam" promise ill for the ultimate career of an organization that will never again be equaled in the history of political events.

All the large cities of the United States have strong Republican and Democratic organizations. The great Republican organization of New York State is controlled by Senator Thomas C. Platt, and is almost as perfect in its working parts as that of Tammany. A great Republican combination is controlled in Chicago by Congressman William Lorimer, while Mayor Carter H. Harrison heads a similar Democratic organization. James G. Blaine, when a candidate for the Presidency, built up what might be termed a "machine," which was almost perfect in its workings. When an effort was made to nominate Gen. U. S. Grant for the Presidency a third time a similar organization worked for him. President Cleveland was never able to perfect such an organization. Nearly all these combinations of politicians are more or less successful as they are able to distribute offices among the men who are their members.

MAKING ARTIFICIAL ICE.

Principle of Machines Used—Method of Freezing and Use of Ammonia—The Ice Crop in the United States.

ICE is now largely manufactured by artificial means. In this day of transporting fresh meats, vegetables and other perishable foods thousands of miles, and when such great industries as that of meat, fruit and others depend largely upon preservation by cold, it was but natural that scientists should cast about for some means of producing refrigeration by artificial process. The expense of cutting ice, together with the uncertainties of the crop because of mild weather, is a source of great dread to merchants; but with a plant equipped for the manufacture of ice little or no trouble is experienced, and the cost is reduced proportionately.

In such industries as great breweries it would be almost impossible to keep the temperature at the required degree without laying in great supplies of ice, and in the great storehouses of the large meat establishments even more inconvenience would be experienced.

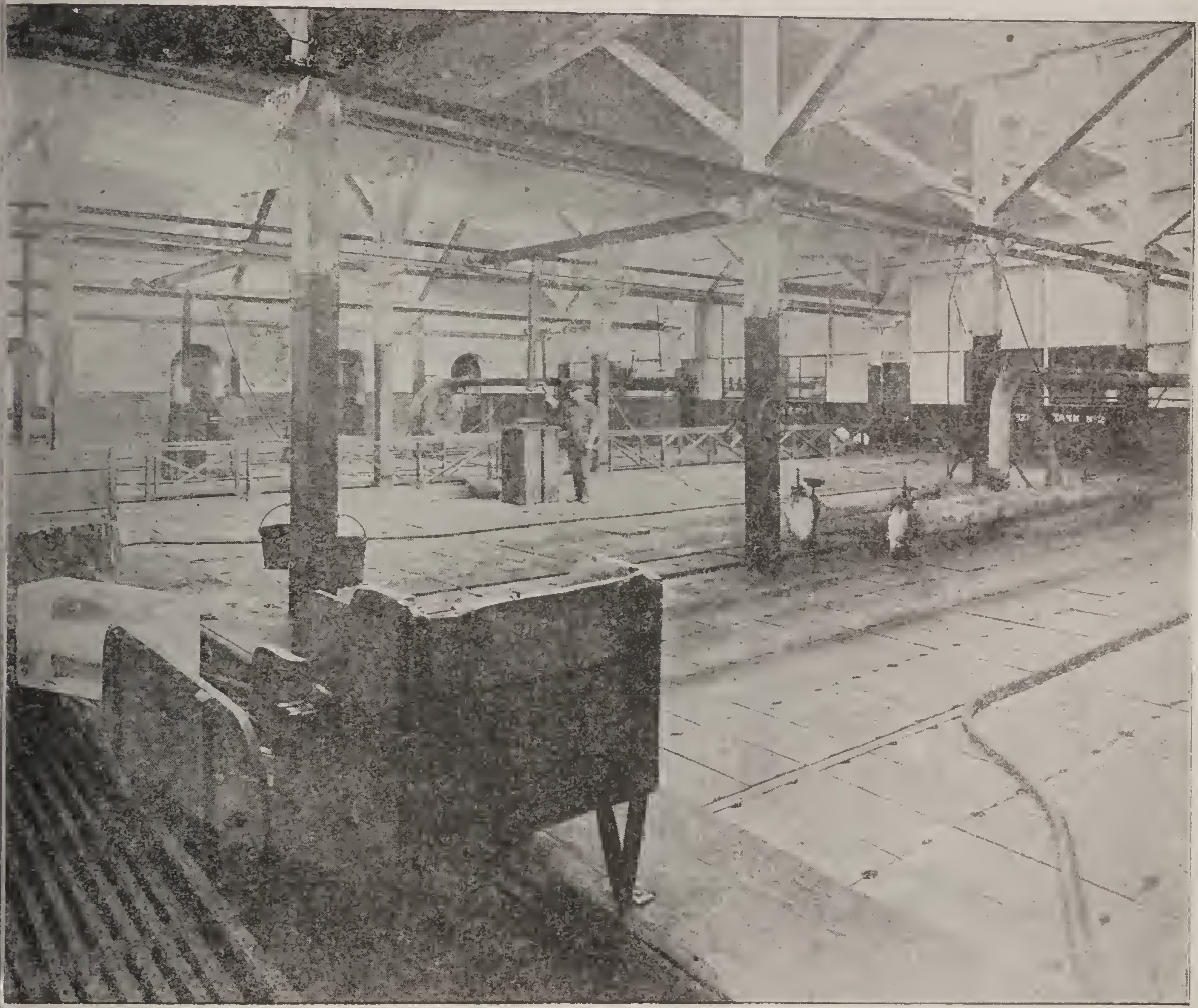
Ice-making Machines.

The principal on which ice machines are operated is that of the absorption of heat of the surrounding atmosphere by the circulation of a liquid of exceedingly low temperature—generally ammonia. Sometimes the process by expansion after great contraction is used, as in the process for making liquid air. This method is governed by the principle that when a gas is contracted it becomes warm, but upon being liberated becomes cool again. If, then, air is submitted to a great pressure and while thus confined is cooled by being passed into pipes bathed in cool water, upon being liberated it will seek to absorb so much heat from the surrounding atmosphere that ice will be formed in its neighborhood. Liquid air has produced the greatest artificial cold, but as yet it has not taken the place of the ammonia ice-plant.

The principle governing this latter process is that, inasmuch as anhydrous ammonia boils at 32 degrees below zero, Fahrenheit, water when brought in contact with it at 32 degrees F. will at once give up 64 degrees of its heat to the ammonia, and will thus become so cold that it freezes.

A Freak of Science.

Numerous methods for making use of this freak of science are in operation. One plan, called the "can" system, is to expose water in cans to the ammonia circulating through coils of pipe laid in a tank of salt water. The ammonia absorbs the heat from the salt water, and this in turn freezes the water in the cans by absorbing its heat. This plan is varied sometimes by circulating the ammonia through great pipes in refrigerators and cooling rooms without making the ice, the heat being absorbed at first hand, thus reducing the temperature to a certain legree of cold. The can process is somevhat antiquated, and while being effective s rather expensive by reason of its bulkness and the long time it takes to start a lant operating — generally about three ays.

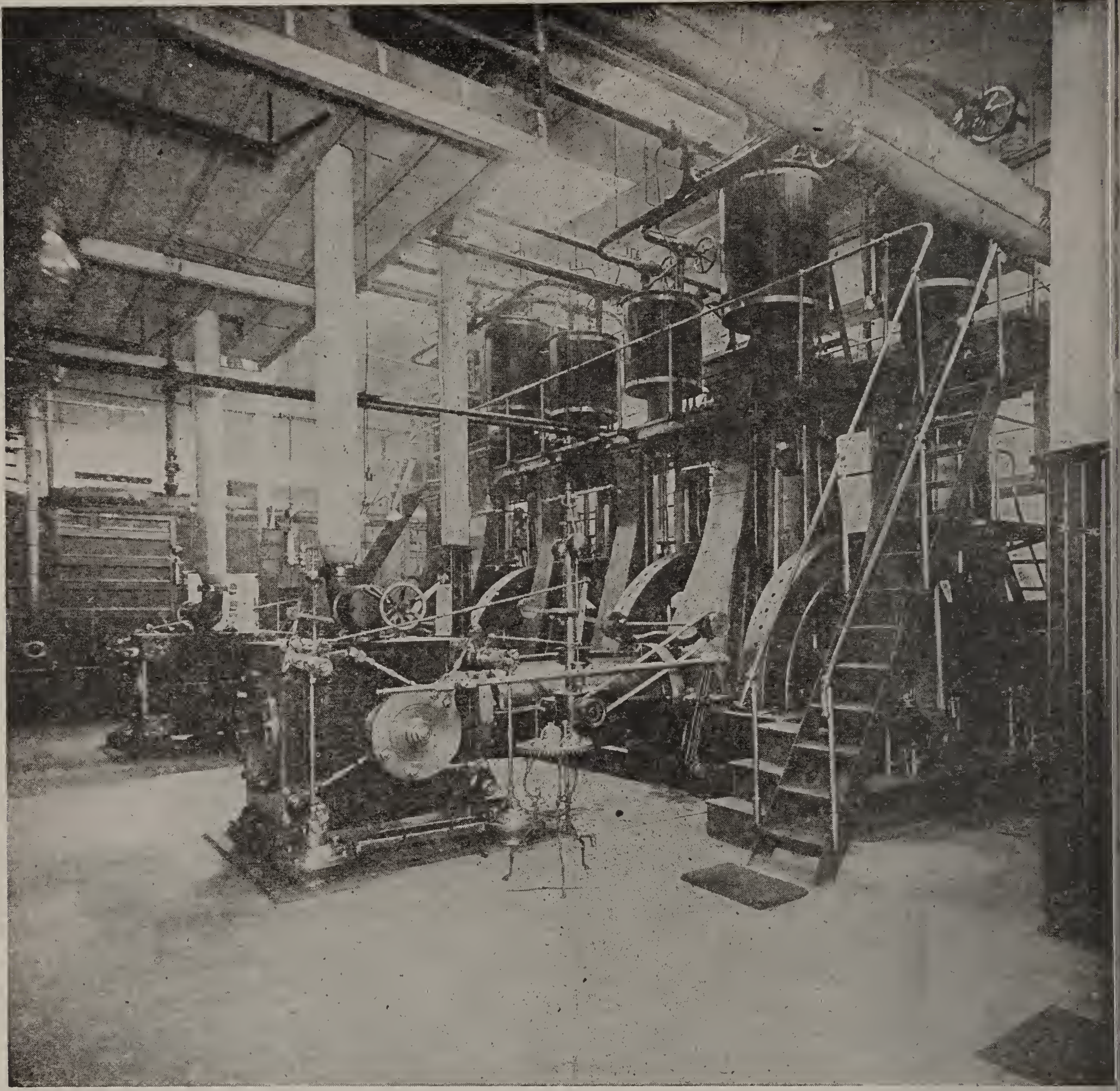


VIEW IN THE FREEZING ROOM

The freezing water is in square tanks beneath the floor. Each tank is block of ice size.

To overcome these deficiencies, D. L. olden has put into operation a new ystem which makes ice at 50 cents a ton ith space required for a plant of only x50 feet, as compared to 100x150 feet r the can system, and a cost by the latr of from \$1.65 to \$1.85 a ton. The same principle of ammonia absorption is used, but everything is more compact, and ice can be produced within a few hours after the plant is started.

The Holden method consists of two parts; the devices for circulating the ammonia without loss, and the ice machine. The ammonia system is a combination of the compression and absorption systems. For it there are necessary three vertical pipes, twelve inches in diameter and forty feet high. They are the still, the absorber and the condenser; and



ENGINE ROOM OF THE CONSUMERS COMPANY ICE PLANT.

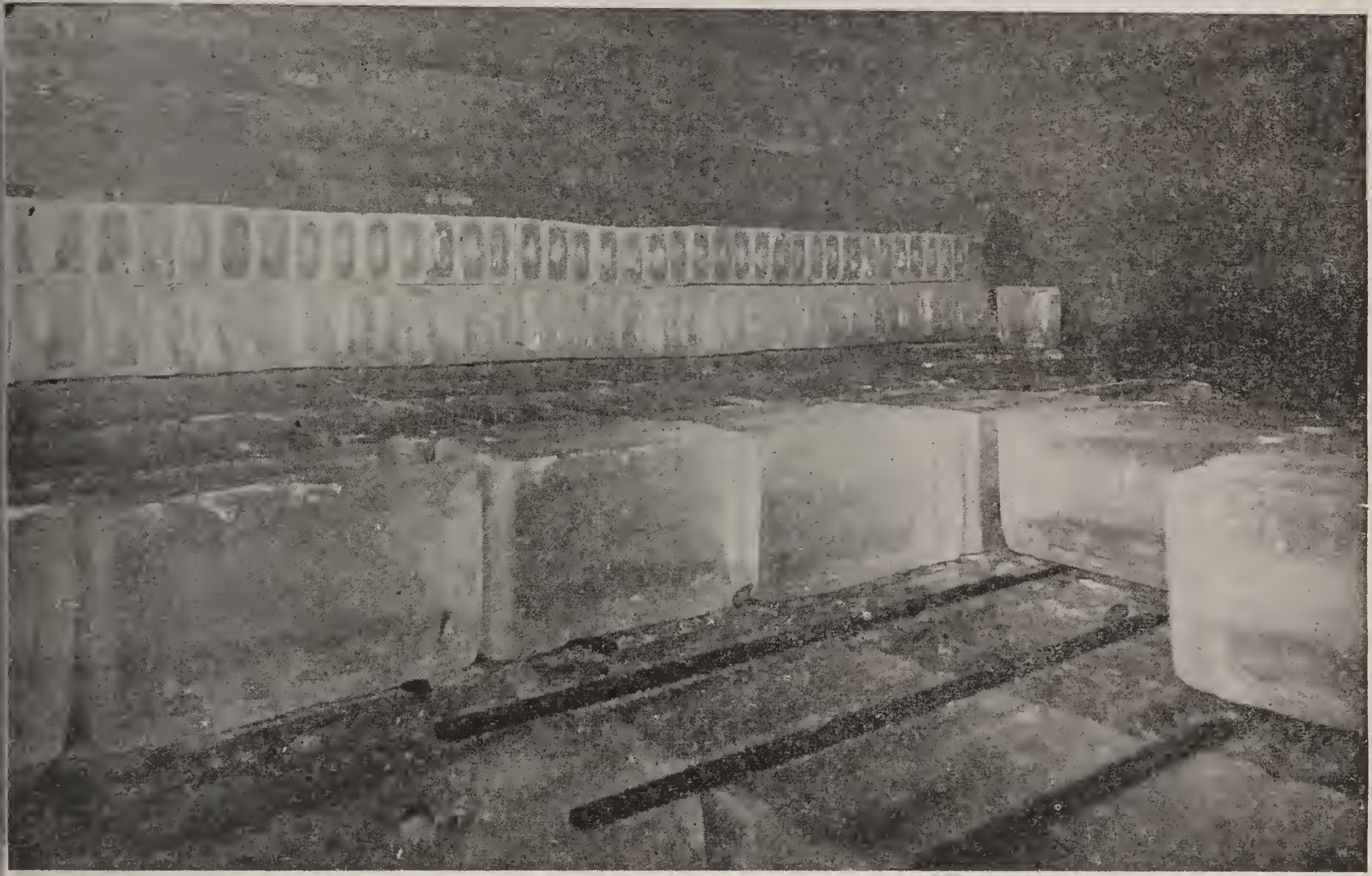
Showing how the ammonia is forced through asbestos covered pipes and kept in circulation in the coils pipe through the brine into which are placed the tanks of water intended to be frozen.

besides these there are two shorter pipes called the interchanger and the cooler, while an ammonia pump furnishes the power for circulation.

Method of Freezing.

Strong ammonia liquor of 32 degrees Bané intensity is forced by the pump by way of the interchanger, where it is partially heated, up to the top of the still.

The still is filled with thirty-six one-inc steam pipes tightly wound with wir Within the numerous steam pipes ai smaller pipes one-fourth of an inch i diameter which carry the steam. Whe the strong ammonia liquor is emptied the top of the still it trickles down th sides of the outer pipes, and the wi breaks it up into smaller drops, giving larger heating surface. As the ammonia becomes hot it gives off ammonia gas, which rises to the top of the still and passes out by another pipe over to the top of the absorber. This device is also filled with pipes, but they contain circulating water instead of steam. By contact with these pipes the ammonia gas is converted into anhydrous ammonia of exceedingly low temperature, and is ready for anhydrous ammonia is admitted in quantities enough to allow about three inches to be at the bottom of the cylinder all the time. As the cylinder rotates the ammonia clings to its sides, and thus a thin film at all times is absorbing the heat of the water in the tank outside. The difference of 64 degrees F., as noted before, absorbs so much heat from the water that a thin coating of ice is always forming on



VIEW OF THE BLOCKS OF ICE READY FOR DELIVERY TO THE CONSUMERS.

he freezing cylinder, which converts it nto ice.

The Ice Machine.

Let us look at the ice machine before ve follow the processes of the ammonia lant further. The freezing cylinder, as s name signifies, is a tank 3½x3½x7 eet, filled with water, in which is a holow cylinder rotating upon hollow trunions. Through one trunnion the

the outer side of the cylinder as it rotates in the water. To prevent this ice from getting too thick, a set of knives is arranged so that thin shavings or "spawls" are trimmed off as the cylinder turns. These naturally rise to the top of the water in the tank, and by means of a screw conveyor are carried with some water to hydraulic presses, where under 350 pounds pressure to the square inch they are pressed into cakes. The pipe leading to the two presses has a three-way valve which automatically closes when one press is full and turns the spawls into the other press. The inside of the presses is of perforated brass, which permits of pressing out all the air and water in the spawls and allows the cakes to issue clear as crystal. With such a plant ten tons of ice can easily be turned out each day.

Work of Anhydrous Gas.

After the anhydrous gas has done its work in the freezer and has grown comparatively warm, it escapes by a pipe through the other trunnion of the cylinder to the top of the absorber. We saw how that in the still the hot gas escaped to the top and was carried to the condenser. As this gas arose a weak ammonia liquor was left behind to trickle down the side of the steam pipes and to collect in a small receiver at the bottom. In order to unite this weak liquor with the spent ammonia gas and thus save waste, it must be cooled somewhat. Accordingly the weak liquor is run off from the receiver at the bottom of the still to the bottom of the interchange and by means of a set of spiral coils rises, because of its heat, and, passin upwards, is reduced in temperature, gi ing off its heat to the strong ammon liquor that is on its way to be heate From the interchanger the coolin ammonia is run downward through coi in the cooler, and by pressure is taken t the top of the absorber, where it mee the ammonia gas from the freezing cyli der. This weak liquor is broken up o the wire coils about the pipes of th absorber, and, just as in the still th allowed the gas to escape when heate now allows the weak liquor and spe gas to reunite into strong ammonia liquo whence it goes to the ammonia pum ready for the journey once more throug the various cycles back to the freezin cylinder,

The ice crop of the United States f 1899 has been estimated at:

	Tons.
Natural ice, cut from streams	6,000,0
Artificial ice, manufactured .	8,500,0
Total	14,500,0

Or, in pounds, 29,000,000,000.

HYPNOTISM.

What It May Accomplish—Method of Hypnotizing—Ridiculous Things the Subject is Made to do.

MUCH interest has been taken during the past few years in the results of psychological research and from this has sprung a special concern in hypnotism. Hypnotic suggestion has proved valuable in the treatment of functional disorders of digestion, absorption and circulation, of nervous condition, and it has assumed importance as an appropriate instrumentality for affecting character change in cases of moral obliquity as well as for developing and exalting mind power. Plainly speaking hypnosis implies a mind condition in which the mental action of a sensitive subject is under the control of an operator who has induced the state. It is characterized by insensibility to outward sounds and images, and to ordinary impressions of sense organs, but by quickened perception of sensations pictured by the hypnotist.

Human beings are hypnotizable by other human beings between whom and themselves exists a peculiar sympathy or harmonious relationship known as rapport. Various methods of inducing hypnotism are practiced, all having in view the fixation of the attention upon some monotonous stimulus of the eye or ear, as sedative music or a bright object like the nickel-plated point-protector of a lead pencil, a transparent crystal, a stud in a shirt bosom, or the eyes of the operator. Perfumes also have hypnotic power; the odor of May blossoms, of new mown hay, of balm-of-Gilead firs, contribute to the induction of mental placidness. Certain colors are also helpful, especially pinks of a low chroma.

Use of the Hands.

In certain instances such a procedure as told above may be supplemented by light passes, or by holding firmly the hand of the patient, by pressing it against the forehead of the operator, or by contact of foreheads, while the whole force of one's personality is concentrated in an effort to overcome an automatic resistance to hypnotization.

Some operators request the patient to take a reclining position on a lounge. Then, by talking soothingly to them for some time, the operator acquaints himself with the dominant propensities of controlling thoughts and above all securing the patient's confidence. Then the patient's attention is concentrated upon a suspended diamond, or some other unique article. The eyes soon become tired from the strain, and the patient is told he is gazing at a sleepy stone which has never failed to induce slumber. Then he is told to think of nothing, to renounce the very intention of renouncing mental effort, and to give himself up with a perfect confidence in the purity of the motives of the operator. Under these conditions the eyeballs soon become fixed, a vacant stare replaces the usual intelligent look, and the eyelids begin to open and close spasmodically. At this stage the suggestion is given that a prolonged refreshing sleep is about to ensue; and in a few moments a long breath is taken and the lids close with a slow regular movement. Deep inspirations follow, and then the operator knows he has secured the deeper personality of his subject.

Gaining Control.

When a person is under the influence of a hypnotist he may be regarded as in a condition in which the part of the nervous system associated with conscious perception is thrown out of gear, without preventing the kind of movements which would result were the apparatus really in action. Impressions are made on the sensory organs; the sensory nerves convey the impression to a part of the brain. In the deepest condition of hypnotism these impressions may not arouse any consciousness, but the result may be the kind of movement which would naturally follow supposing the person had been conscious. The movements of an hypnotic are usually of an imitative kind. The mere suggestion of a movement has not always proved successful. It must be made before the eyes of the person who is expected to perform the movement. The patient is in a sense an automaton played upon by the operator through the medium of the patient's sensory organs. In deep hypnotism the patient has no idea corresponding to the movements he makes to the example of the operator.

In some cases where the patient is but slightly hypnotized there is a curious combination of feelings. He knows he is being made a fool of, but does many ridiculous things at the bidding of the operator. In some respects he is like a somnambulist who acts the movements of a disturbed dream. After coming back to his original self he remembers all that happened while he was in that state. In some cases, however, the hypnotism is so deep as to resemble coma, and in these there is no trace of sensory impressions or of movements.

Experiments Made.

The experiments that have been made with persons who could be hypnotized have been very curious. The hypnotist would tell them to bark like a dog. They would do this. They would be ordered to crawl on their hands and feet as if they were a horse. They would obey. When told to crow like a rooster they made fairly successful attempts to do so. One subject was told to go and touch a stove. The stove was cold at the time, but the hypnotist told the subject it was hot. The instant the stove was touched the subject cried out with pain, having experienced the sensation of heat.

Paul King, a quite noted hypnotist at one time, having gained control of a lady's mind, told her that he was thinking of something that she very much cherished, and for her to go and get it wherever it was. She was at that time in King's studio with a party of friends. She immediately left it in his company and the company of her friends and, still under his influence, went to her home and took from its place on the mantel a portrait of her husband and gave it to King. Experiments like this suggets how far it might be possible for a corrupt person having great hypnotic power to gain control of human minds and influence them for bad. The law has not yet taken cognizance of this phase of hypnotism.

Recent experiments made in New York have led scientists to advance a theory that it would be possible for a hypnotist to cause a subject to die by simply instructing the latter to cease breathing. This would be murder in the eyes of the law. If this can be done, the suggestion has been made that hypnotism take the place of the eloctrocution chair.

Women, as a rule, hypnotize more easily than men. It is not possible to hyptonize any one without their first mentally consenting or yielding to the influence of the hypnotist.

BRAZIL.

A Rich Agricultural Country—Varied Characters of the Soil—The Inhabitants and Their Religion.

BRAZIL, a Republic in South America, is bounded on the north by Venezuela, British, Dutch and French Guiana; on the east by the Atlantic Ocean; on the south by Uruguay, the Argentine Republic, Paraguay and Bolivia and on the west by Peru and Columbia. Its area is claimed to be 3,209,878 square miles. Its capital is Rio de Janerio. The southeastern portion of Brazil is mountainous, the central, northeastern and western parts consist of a plateau, with the low plains of the Amazon to the north. The principal rivers are the Amazon and its tributaries, Parana and San Francisco, with the Uruguay and Paraguay on the frontiers. Part of the Amazon basin is covered with a dense and rich forest of tropical growths. The principal pursuit of the inhabitants is agriculture. The annual exportations include coffee, sugar, hides, rubber, cotton and tobacco.

The government is a federal republic with a president at its head and having a congress consisting of a senate of 63 members and a chamber of 212 deputies. The country is divided into twenty states and the federal district of Rio.

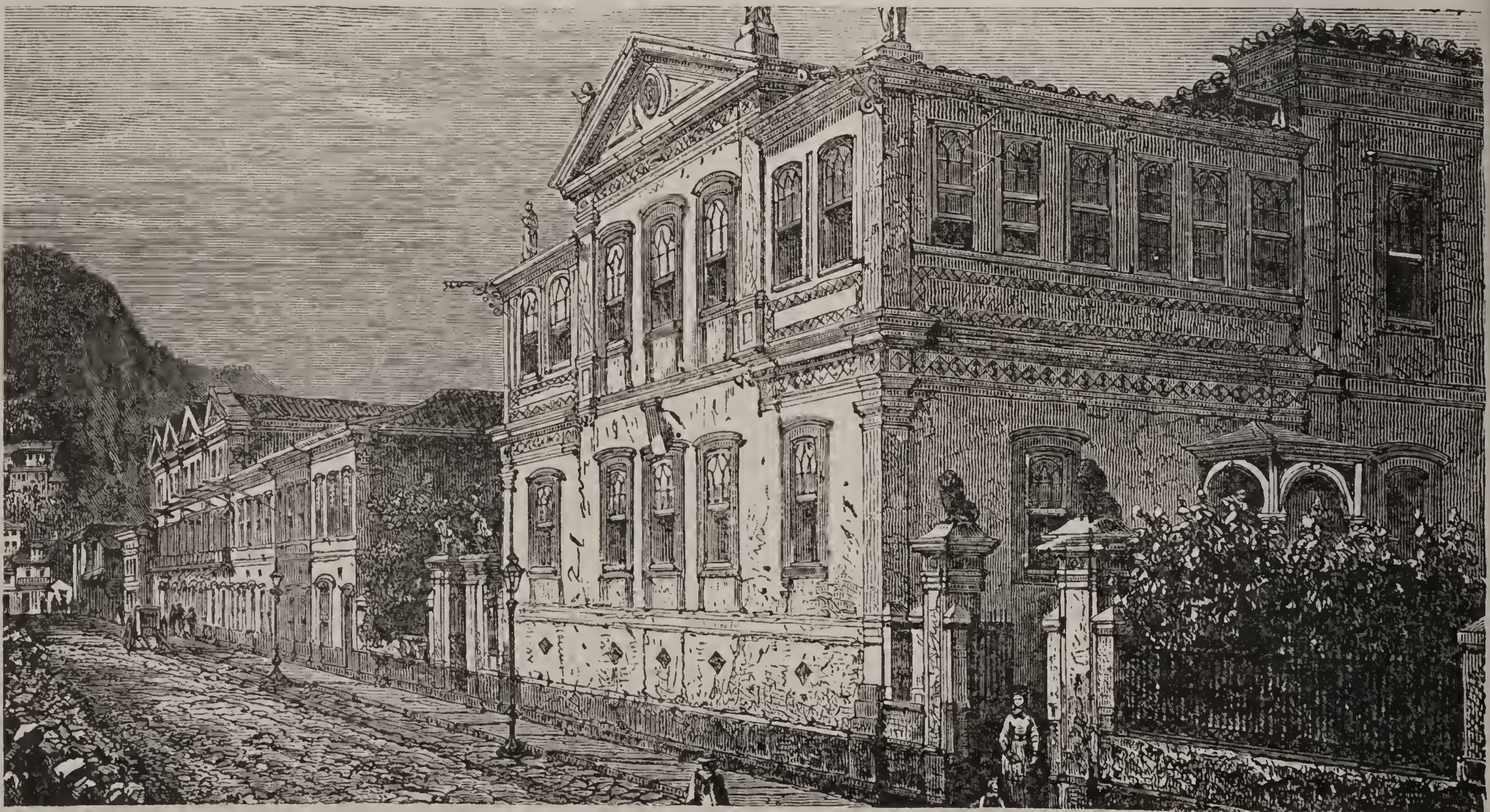
The inhabitants are Brazilians, Indians, negroes, mixed races and colonists from Germany, Italy and Switzerland. The language chiefly spoken is the Portuguese; the religion Roman Catholic. Brazil was discovered by Vincente Yanez

THE BANYAN TREE, SOMETIMES COVERING SEVERAL ACRES.

The northern part of Brazil is famous for its luxuriant vegetation, and many native trees not to be found elsewhere. A great variety of richly flavored nuts are grown in great abundance. The development of this vast country will likely attract the attention of the world during the next several decades.

LARGEST CHRYSANTHEMUM PLANT IN THE WORLD.
Grown in Japan, the home of the flower and valued at $50,000.

Pinzon, January 26, 1500, and independently by the Portuguese Cabral in the same year. The country was claimed and colonized by the Portuguese, and was the residence of the exiled Portuguese royal family in the Napoleonic period. In 1822 its independence was proclaimed. An empire was formed with Dom Pedro, son of the Portuguese king, as its first emperor. In 1831 he was compelled to resign and give way to his son, Pedro II. In 1865-1870 Brazil allied with the Argentine Republic and Uruguay, and defeated Lopez of Paraguay. In 1871-1888 slavery was abolished. A revolution broke out in 1889, overthrowing the empire, and compelling the imperial family to leave the country. A provisional government under Fonseca was established. In 1890 a national congress was summoned, and 1891 it proclaimed the Constitution of the United States of Brazil. Fonseca, the first president, assumed control of affairs in 1891, but was compelled to resign. He was succeeded by Peixoto. Revolts have frequently occurred, and in 1893 a serious rebellion of the fleet broke out under Mello.



EMPEROR'S PALACE AT RIO DE JANEIRO

THE AMERICAN INDIAN.

The Former Occupant of America—Various Tribes and Stocks—Where the Large Reservations are—Numbers Increasing.

THE American Indian was the original occupant of the soil of the North American continent. There were possibly 1,000,000 in what is now the United States when Christopher Columbus came in 1492. There are now about 200,000, of whom less than 50,000 are in the Northwest. The predominant tribes at the present time are the Sioux, Apache, Cherokee, Chippewas, Cheyennes and Shoshones. The original tribes and where they were first located are given herewith:

STOCKS AND TRIBES. ORIGINAL LOCALITY.

Algonkian, East Canada and United States.

STOCKS AND TRIBES. ORIGINAL LOCALITY.

Abnaki, Nova Scotia.
Arapaho, Upper Kansas River.
Blackfeet (Siksika), Upper Missouri River.
Cheyenne, Upper Arkansas River.
Chippeway, Lake Superior.
Cree, south of Hudson Bay.
Delaware (Lenape), Delaware River drainage.
Illinois, Illinois River.
Kaskaskia, Mississippi River below Illinois River.
Kickapoo, Illinois River.
Menominee, Green Bay, Mich.
Miami, between Miami and Wabash rivers.
Micmac, Nova Scotia.
Mohegan, Hudson River.

A FAR WEST TOWN WITH INDIANS IN THE FOREGROUND.

The customary saloon and general merchandise store are shown and the rails of a transcontinental line.

STOCKS AND TRIBES. ORIGINAL LOCALITY.

- Montagnais, East Canada.
- Manticoke, East Chesapeake Bay.
- Narragansett, Rhode Island.
- Ottawa, south of Lake Huron.
- Passamaquoddi, Maine.
- Piankishaw, middle Ohio River.
- Piegan, Upper Missouri River.
- Pottawattomi, south of Lake Michigan.
- Powhatan, Virginia.

STOCKS AND TRIBES. ORIGINAL LOCALITY.

- Lipan, Rio Grande, Texas.
- Loucheux, Lower Makenzie River.
- Mescalero, New Mexico.
- Montagnais, Central Canada.
- Navajo, New Mexico.
- Slave, Makenzie River.
- Tinne, Northwest Canada and Alaska.

Attacapan, Texas coast.

Beothukan, New Foundland.

THE CARLISLE COLLEGE FOOTBALL TEAM.

Composed wholly of young Indians being educated by the United States. The swiftest running football team ever got together.

STOCKS AND TRIBES. ORIGINAL LOCALITY.

- Sac and Fox, Sac River.
- Shawnee (Vagrants), South Central United States.

Athapascan, Alaska, Canada, California, New Mexico.

- Apache, New and Old Mexico, and Arizona.
- Chepewyan, South Central Canada.
- Hupa, North California.
- Jicarilla, New Mexico.
- Kuchin, Yukon and Copper rivers, Alaska.

STOCKS AND TRIBES. ORIGINAL LOCALITY.

Caddoan, Louisiana, Texas, Nebraska, Dakota.

- Adaize, Red River, Texas.
- Arikara, Dakota.
- Caddo, Texas.
- Nachitoches, Red River.
- Pawnee, Arkansas River.
- Wichita, Red River, Arkansas.

Chimakuan, Puget Sound, Washington.

Chimarikan, North California.

Chimmesyan, Northwest British Colombia.

STOCKS AND TRIBES. ORIGINAL LOCALITY.

- Nass and Tsimshian, Skeena and Nassac rivers, British Columbia.
- Chinookan, Columbia River, Oregon.
- Chitimachan, South Louisiana.
- Chumashan, California coast, 34 to 35 deg. North.
- Coahuiltecan, Rio Grande mouth.
- Copehan, North Central California.
  - Wintun, Trinity River, California.
- Costanoan (Mutsun), south of Golden Gate, California.
- Eskimoan, Arctic coast.
- Esselenian, south of Monterey Bay, California.
- Iroquoian, the Great Lakes and Carolina.
  - Cayuga, south of Lake Ontario.

STOCKS AND TRIBES. ORIGINAL LOCALITY.

  - Cherokee, North Carolina, etc.
  - Conestoga, South Susquehanna River.
  - Erie, south of Lake Erie.
  - Huron, between Lake Ontario and Huron.
  - Mohawk, East New York.
  - Neutral Station, west of Niagara River.
  - Oneida, Central New York.
  - Seneca, Central New York.
  - Susquehannock, head of Chesapeake Bay.
  - Tuscarora, migrated to New York from Virginia.
  - Wyandot, between Lake Ontario and Huron.
- Kalapooian, Willamette River, Oregon
- Karankawan, Matagorda Bay, Texas.
- Keresan, New Mexico.

STOCKS AND TRIBES. ORIGINAL LOCALITY.

  - Acoma, Laguna and other Pueblos, New Mexico.
- Kiowan, Nebraska and Wyoming.
- Kituanahan, East British Columbia.
  - Kutenay, British Columbia.
- Kolushan, Southeast Alaska.
- Kulanapan (Pomo), coasts of California, 39 deg. North.
- Kusan (Coosan), Coos Bay and River, Oregon.
- Lutuamian, Klamath Lakes, Oregon and California.
  - Klamath and Modoc.
- Mariposan (Yokut), Tulare Lake, California.

STOCKS AND TRIBES. ORIGINAL LOCALITY.

- Moquelumnan, interior of California.
- Muskhogean, Gulf States, east of Mississippi River.
  - Chickasaw, Upper Mobile River.
  - Chictaw, between Mobile and Mississippi Rivers.
  - Creek (Muskoki), between Mobile and Savannah rivers.
  - Seminole, Florida.
  - Yamasi, South Carolina coast.
- Natchesan, present site of Natchez.
- Palaihnihan, Pitt River, Northeast California.
- Piman, east shore, Gulf of California.
  - Opata, Sonora, Mexico.
  - Papago, Rio Gila, Arizona.

A PANEL PICTURE OF AMERICAN INDIANS ON THE WARPATH.
Showing their method of riding, their costume and their swift running ponies.

STOCKS AND TRIBES. ORIGINAL LOCALITY.

Pujunan, East Sacramento River, California.
  Maidu, Sacramento River, California.
Quorateau, Klamath River, California.

STOCKS AND TRIBES. ORIGINAL LOCALITY.

  Atnah, Fraser River.
  Bellacoola, British Columbia coast.
  Clalla, Washington State.
  Lummi, Washington State.

A PERFECT TYPE OF THE AMERICAN INDIAN.

Showing a chief in his robes of authority holding his calumet or peace pipe and having his war bonnet and blanket conspicuously displayed.

STOCKS AND TRIBES. ORIGINAL LOCALITY.

Salinan, east of California, 35 to 37 deg. North.
Salishan, Washington, British Columbia and Montana.

STOCKS AND TRIBES. ORIGINAL LOCALITY.

  Nisqualli, Washington State.
  Many tribes with names ending in "ish."
Sastean, Middle Klamath River, California.

STOCKS AND TRIBES. ORIGINAL LOCALITY.

  - Shasta, Klamath River, California.
- Shahaptian, Upper Columbia River, Oregon, etc.
  - Klikatat, Middle Columbia River.
  - Nez Perce, Middle Columbia River.
- Shoshonean, Great Interior Basin.
  - Bannock, Montana.
  - Chemahuevi, Colorado River Agency, Arizona.
  - Comanche, Northern Texas.
  - Moki (Hopi), Northeast Arizona.
  - Pai Ute, Utah.
  - Snake, Idaho and South Oregon.
  - Ute, Utah.
- Siouan, chiefly Missouri River drainage.
  - Assiniboin, Saskatchewan River.
  - Biloxi, Mississippi.
  - Catawba, North and South Carolina.
  - Crow, Yellowstone River.
  - Dakota, Upper Mississippi River.
  - Iowa, Iowa River.
  - Kansas (Kansay), Kansas.
  - Mandan, Upper Missouri River.
  - Minnetaree, Yellowstone River.
  - Ogallala, Missouri River.
  - Omaha, Elkhorn River.
  - Osage, Arkansas and Osage rivers.
  - Otoe, Platte River, Nebraska.
  - Ponca, Middle Missouri River.
  - Quapaw, Lower Arkansas River.
  - Teton, Missouri River.
  - Tutelo, Roanoke River, Virginia.
  - Winnebago, west of Lake Michigan.
- Skittagetan, Queen Charlotte Islands.
  - Haida, Queen Charlotte Islands.
  - Kaigani, Queen Charlotte Islands.
- Takilman, Rogue River, Oregon.
- Tanoan, New Mexico.
  - Taos and other Rio Grande Pueblos, New Mexico.
- Timuquanan, Florida Peninsula.
- Tonikan, Lower Yazoo River, Mississippi.

STOCKS AND TRIBES. ORIGINAL LOCALITY.

- Toukawan, West and Southwest Texas.
- Uchean, Savannah River, Georgia.
- Waiilatpuan, Wallawalla River, Oregon
- Wakashan, Vancouver Island and British Columbia.
  - Aht, Vancouver Island.
  - Haeltzuk, British Columbia.
- Washoan, Northwest Nevada.
- Weitspekan, Lower Klamath River, California.
- Wishoskan, Mad and Eel rivers, California.
- Yakonan, coast of Oregon.
- Yanan, coast of Oregon.
- Yukian, Round Valley, California.
- Yuman, Lower California and Mexico.
  - Cocopa, Colorado River mouth.
  - Diegueno, San Diego, California.
  - Havasupai, Lower Colorado River.
  - Maricopa, Gila River, Arizona.
  - Mohave, mouth of Colorado River.
  - Zunian, New Mexico.

The last census shows that most of the Indian tribes are increasing in number and not decreasing. The government has opened many Indian schools like that of the famous Carlisle at which the Indian children are educated free of charge. There are also schools on the reservations. The Indians still hold in their own name many million acres of land and quite a number have taken to farming. The great Indian reservations of the country are now in Indian Territory, Oklahoma, Wisconsin, Northern Minnesota, both of the Dakotas, Montana, Wyoming, Colorado, Arizona and New Mexico.

MODERN ART.

Art, What It Is—Various Divisions and What Constitutes Each—Meaning of a Work of Art.

ART is the production or construction of objects. Black art, necromancy, sorcery, is the fancied power of performing wonderful feats by preternatural means, especially means derived from the assistance of the powers of evil. Decorative art is that branch of art which has for its primary object merely the pleasure of the eye, especially in decoration which is subservient to architectural features or to form, as in ceramics. Fine arts are those arts that seek expression through beautiful modes; specifically architecture, sculpture, painting and engraving. Plastic arts, sculpture, including all subordinate or related arts by which objects are represented in the round or in relief. A work of art is anything in the formation or into the accomplishment of which art in any sense has entered.

Some famous modern masters of art and their works are: Henry's Chicago; Wendt's Autumn; Werthener's Lion and Butterfly; Clement's Circassienne; Fery's Niagara Falls; Flagg's Hebe; Turner's Sunset and Reynold's English Maid.

While European artists still lead the world in painting the works of American artists are beginning to attract great attention, not only at home but abroad. A large number of American painters exhibited at the recent Paris Exposition and received various medals of honor. One of the best known American painters whose portraits sold in the galleries of England and France was G. P. A. Healy, who died a short time ago. Mr. Healy's early art work was in Chicago. He ranked as one of the best of modern portrait painters.

THE ATELIER OR STUDIO OF AN ARTIST.

Showing his canvas, method of dress and arrangement of the room.

MEXICO.

Location, Character of Soil—Leading Industries—Early Inhabitants—Principal Historical Events—Present Inhabitants.

MEXICO is bounded on the north by the United States, on the east by the Gulf of Mexico and the Caribbean Sea, on the south by British Honduras, Guatemala and the Pacific Ocean, and on the west by the Pacific Ocean. Its capital is the City of Mexico. It comprises the peninsulas of Lower California and Yucatan, aside from the main portion, and has a complete area of 767,005 square miles. The surface is generally a tableland traversed by high mountain ranges. Silver, gold, copper and lead comprise the principal mineral products. In the north the inhabitants are chiefly engaged in agricultural pursuits and live-stock raising. Sugar, maize, coffee, tobacco and hemp are grown.

Mexico is divided into twenty-seven states, one federal district and two territories. It has a republican form of government (modeled after that of the United States), with a president at the head of the government. It has also a congress (senate of two members from each state, and lower house of 227 members).

A COFFEE PLANTATION IN OLD MEXICO.
Showing tropical foliage and the ruins of an ancient gate.

The early inhabitants were Aztecs and other native races. The present inhabitants are chiefly creoles of Spanish descent, Indians and mixed races, including Mestizos and Zambos. The predominant language is Spanish; religion, Roman Catholic.

The chief events in the history of Mexico are the invasion of Cortez in 1519; conquest of the capital in 1521; the country made a

THE CUT OF NOCHISTONGO, MEXICO.

Blasted out of solid rock for railroad passage. The cut is 200 feet deep.

Spanish colony under the name of New Spain, and after 1535 a viceroyalty; revolution under Hidalgo begun in 1810; guerrilla warfare until the revolution under Iturbide in 1821; last Spanish viceroy deposed in 1821; empire under Iturbide, 1822-1823; secession of Texas, 1836; war with the United States, 1846-1848; after this there were frequent changes of government for some time; foreign intervention in 1861; war with France commenced, 1862; empire under Maximilian upheld by French troops, 1864-1867; French troop withdrawn in 1867 restoration of the republic in 1867.

In portions of Mexic where the rainfall i sufficient the vegetatio is rich and of a tropica character. Extensiv forests abound in valuable timbers, dye woods and medicina plants. There are mahogany, rosewood copal, caucho (India rubber), sarsaparill and vanilla trees an plants.

The fauna of Mexic is composed of severa varieties of the bear the wolf, coyote, skunk bison, squirrel, marten

COTTON MILLS OF HERCULES, MEXICO.

Showing the great court yard.

A TROPICAL ROAD THROUGH A COFFEE PLANTATION.
Near Cordova, Old Mexico; tropical foliage shown.

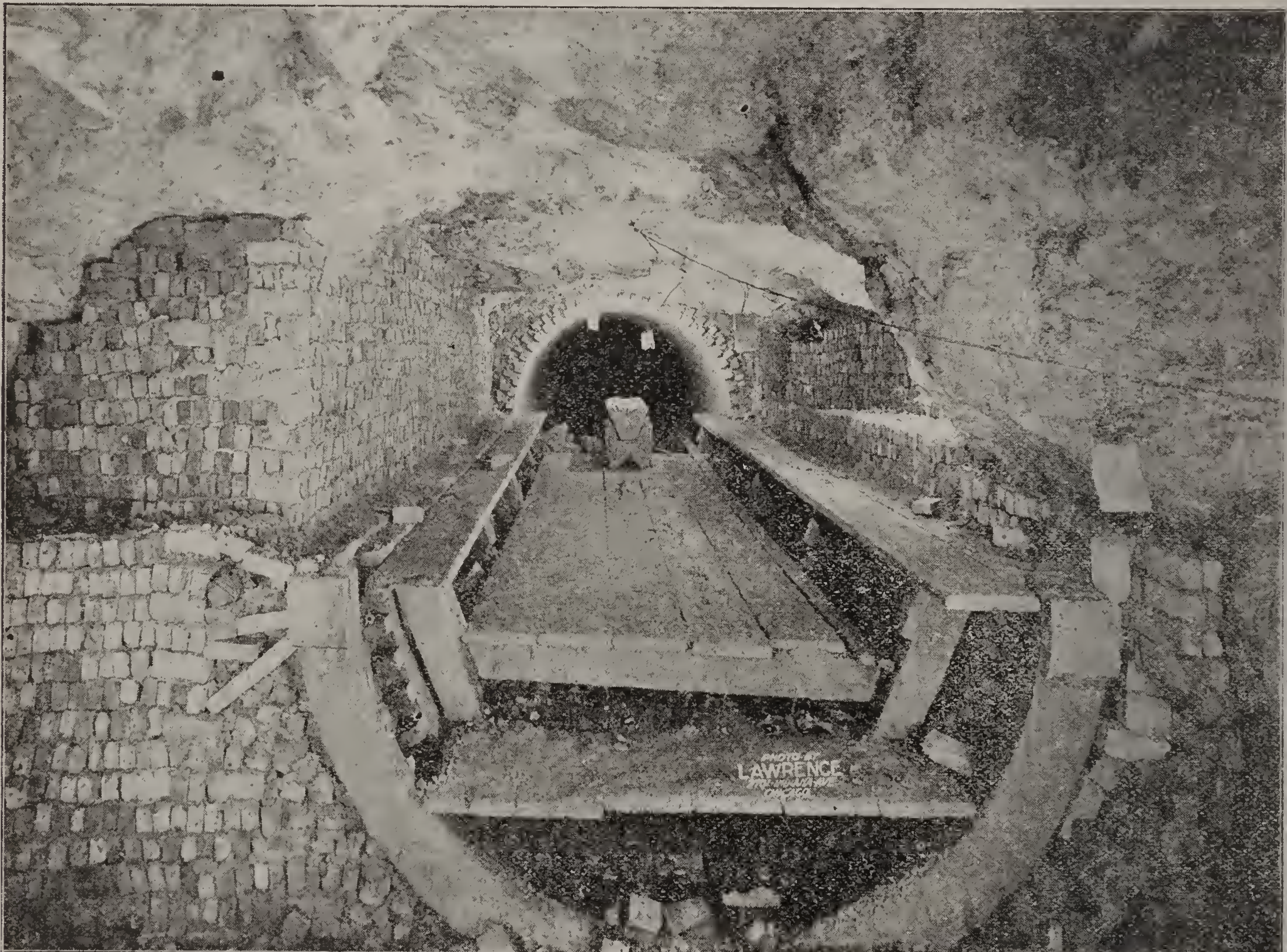
tter, rattle-snake, nocking-bird and many vild fowl similar to hose of northern regions, while the monkey, puma, jaguar, loth, tapir, alligator, oa, scorpion, tarantula, arrot, trogan identify t with the tropical regions. European donestic animals thrive vell in Mexico—cattle, heep and horses being ound on the ranches of he northern states.

The city of Mexico, he capital, is the largst and finest in all panish-America. Its treets are broad, well aved and lighted. Here is a cathedral, ne of the largest in America, founded 1573 and completed in 1657. And here o are picture galleries, convents, schools nd libraries whose age and history make hem points of interest and instruction, s well as fascination. The industries of ne City of Mexico are varied, its climate quable, but its drainage not very good. The city dates from either the year 1325 or 1327 when the Aztecs first gathered there in the form of a settlement. With the advent of the Spanish in 1519 the city became the scene of many revolutions but since the death of Maximilian peace has been restored and Mexico has become a city of refining and civilizing influence over the natives.

WATER SUPPLY.

How a Great City Drinks—Underground Tunnels Built—Lake Supply is Drawn Upon—Billions of Gallons Used Annually.

THE city of Chicago contains one of the most wonderful waterworks systems in the world, and may be used as an illustration of how the many people in the large cities are supplied with their drinking and bathing liquid, as well as fire protection. The city of Chicago draws its water supply from Lake Michigan. Buildings are erected in the lake, two, four and six miles from the shore line. These buildings have foundations which extend to the bottom of the lake and below that bottom fifty, sixty and seventy feet. At the bottom they connect with underground tunnels built from the land. The

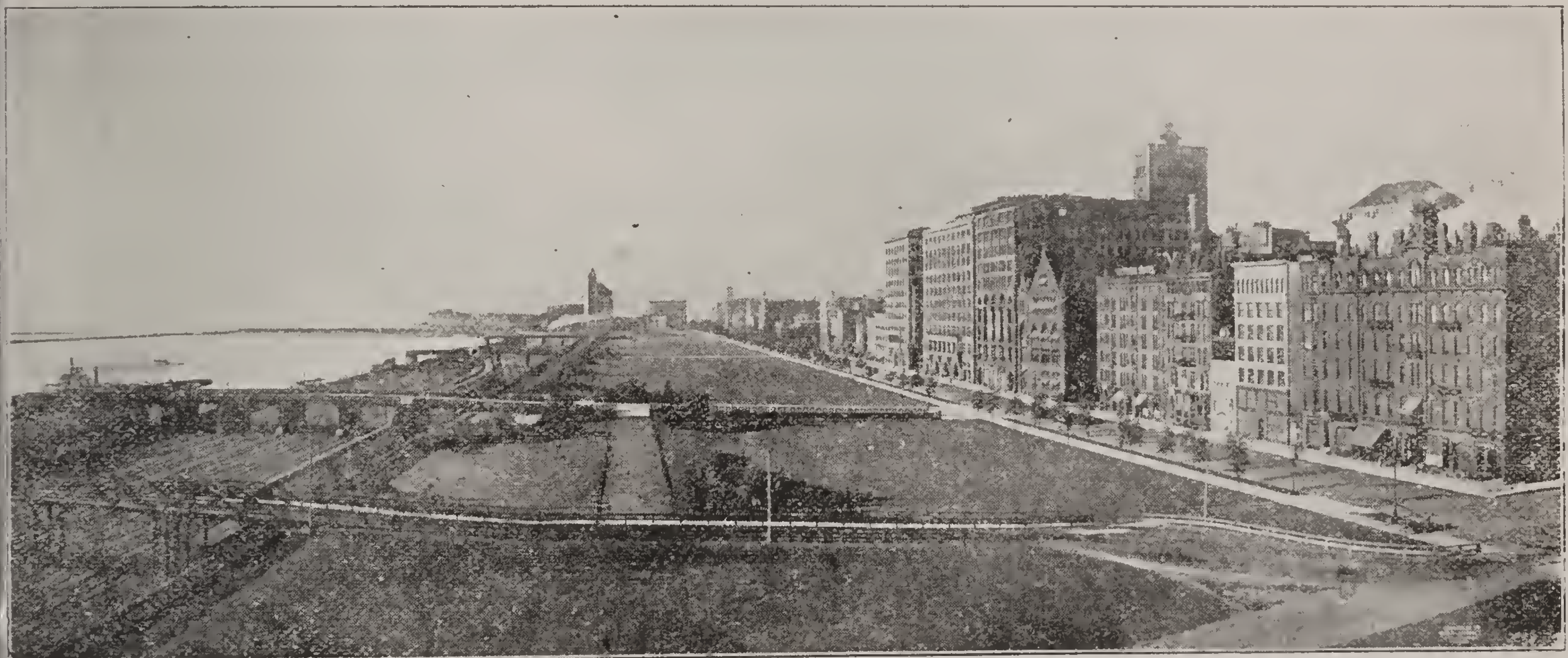


A HALF SECTION OF AN UNDERGROUND WATER TUNNEL OF THE CITY OF CHICAGO

Through this the water used by the city is conveyed from Lake Michigan.

ater which the city is to drink goes into hese buildings, which are called cribs, nd passes through gratings to the tunels. The gratings are used to keep out oating timbers, debris and ice.

The water flows through these tunnels o the land, where there are pumping staions. The pumps of these stations ather this water up and force it into he mains leading through the streets. hese mains or pipes convey the water to he private residences. Hydrants, or upight pipes, are placed at the various treet corners, and these connect with he mains and are used for fire engines. ince the construction of the drainage hannel, which carries all of Chicago's sewage away from the lake, the city has secured one of the best water supplies in the world. The pumping engines of the city each furnish 20,000,000 gallons of water a day when in service. The city, which has 2,000,000 inhabitants, uses about 90,000,000,000 gallons of water a year. It has nearly 2,000 miles of water mains or pipes. Each one of its fire engines has a capacity for pumping 1,100 gallons of water per minute upon a fire. The water department pays its own expenses through its revenue from the water it sells. The city owns the water plant, and this plant is a practical illustration of the value of municipal ownership.



PANORAMA OF THE LAKE FRONT, CHICAGO.

But a few years ago a part of the lake.

THE LARGEST LOCOMOTIVE.

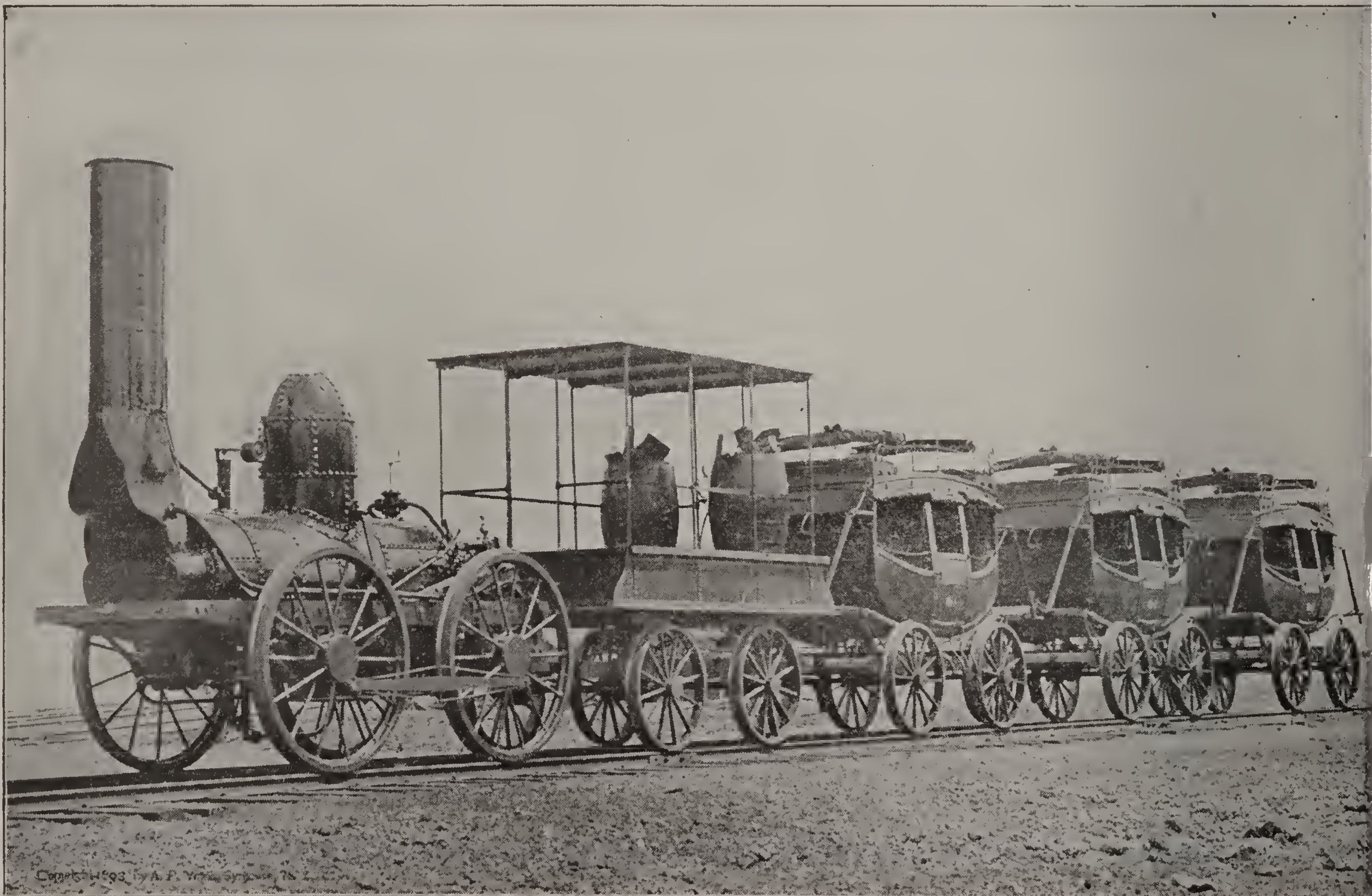
Where Built and How it Compares With Other Engines—Dimensions and Capaci
—Some Rivals.

THE illustration on page 280 shows the gigantic proportions of the engine that holds the world's record for size, weight and power. It was built by the Pittsburg Locomotive Works for the Pittsburg, Bessemer and Lake Erie Railroad. The table on p. 279 is a comparison with the three other next largest engines showing how much this surpasses them.

Engine 151 is meant for hauling exce tionally heavy loads of ore and iron moderate speed. Its net hauling capaci on a level track is 7,847 tons. When t engine is working to its full power the is a pull on the draw bar of 56,300 pounc

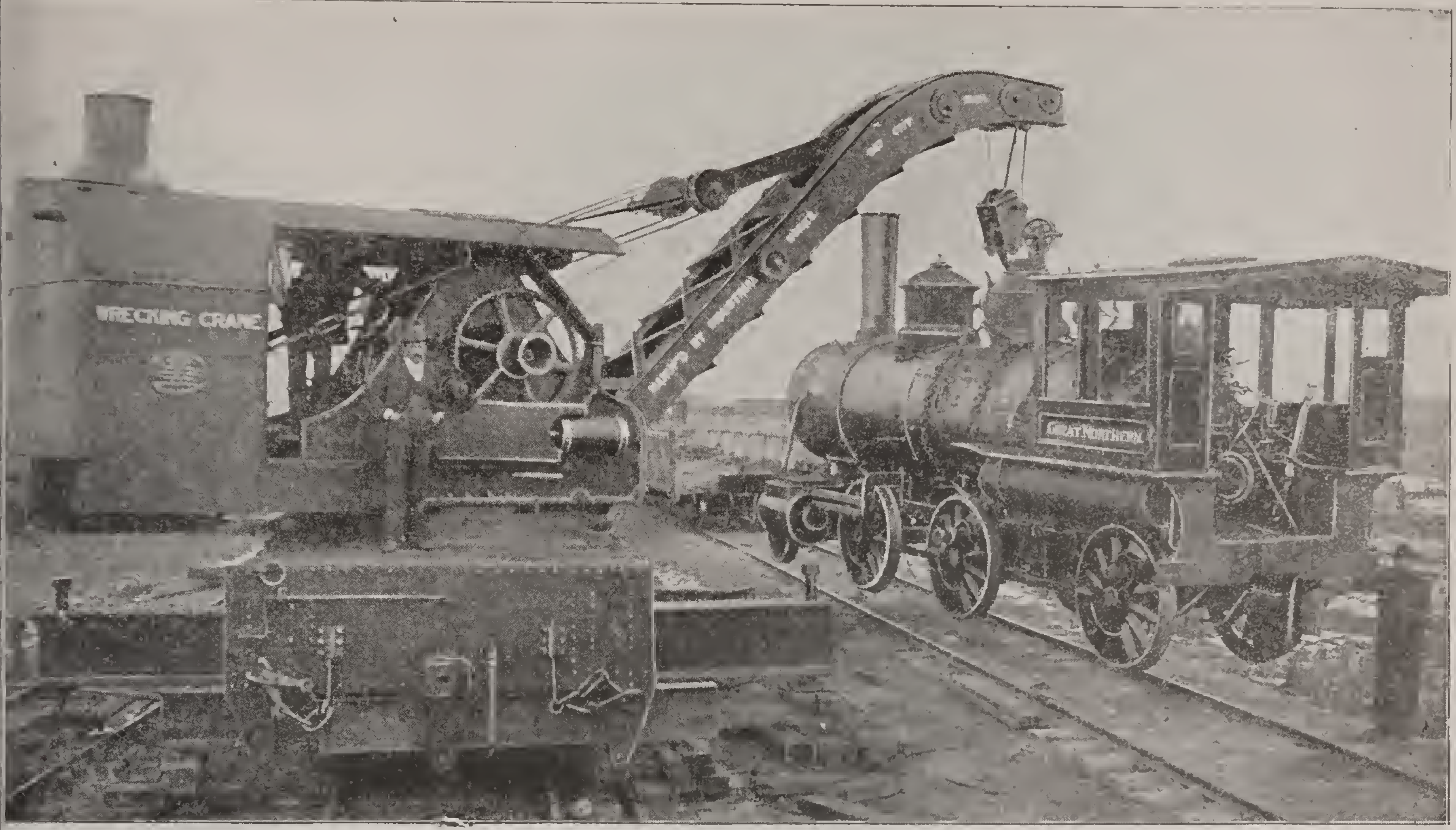
A Rival Monster.

All the great railway systems of tl country are after big locomotives. Tl is a picture also of a type of Illin Central locomotive that came fr



THE FIRST RAILWAY IN AMERICA.

Not constructed for fast travel, comfort, nor heavy hauls. The engine, though, was called the "Rocke



A GIANT WRECKING CRANE.

Used in moving great masses of iron and steel. It is now lifting a derailed locomotive to the track.

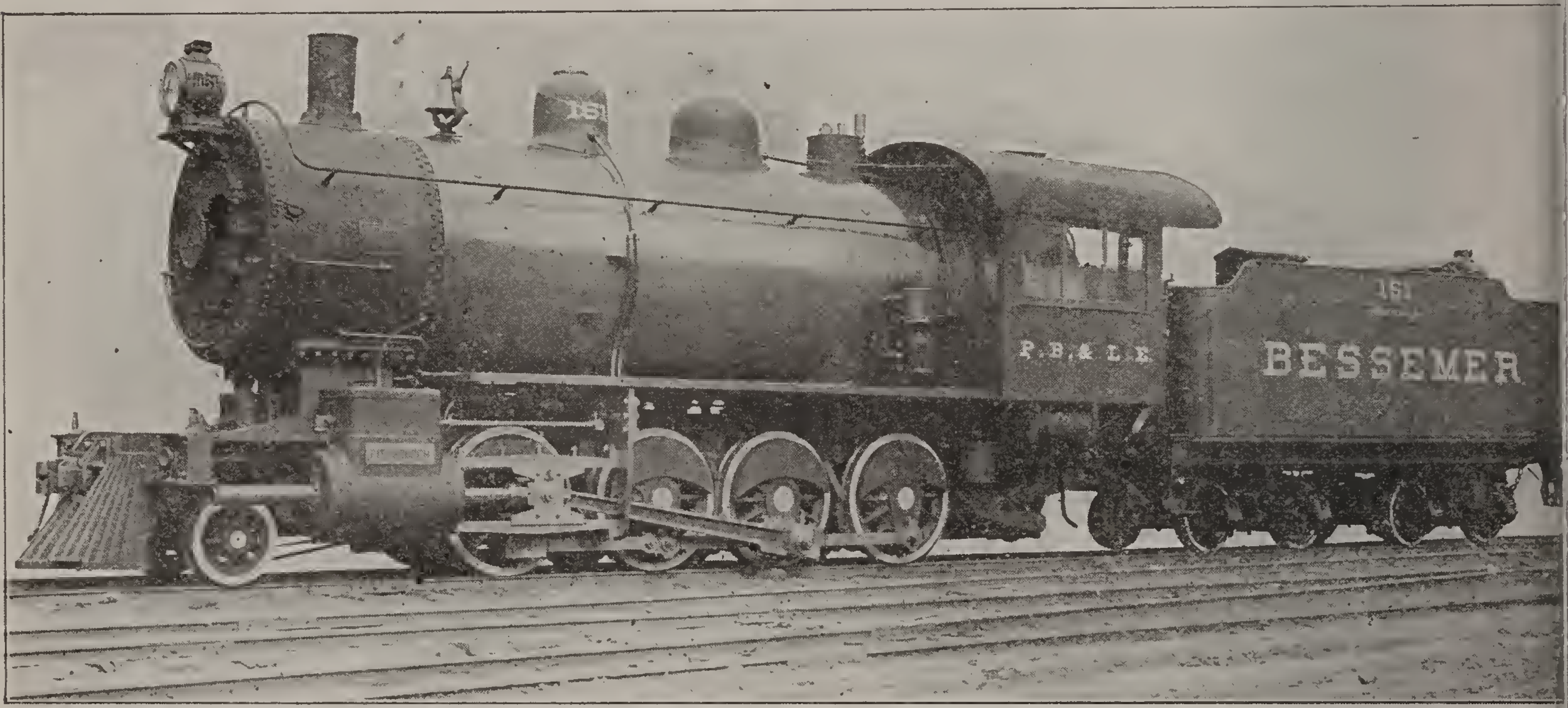
e shops. When it first touched the rails was the biggest locomotive in the orld, but so rapid has been the increase n size of these mechanisms that there is ow at least one, if not others, larger. Still, so far as bigness is concerned, this monster, which is now hauling freight on the Illinois Central, will serve as a capital illustration of what the skilled mechanics of to-day can do.

ailroad	P. B. & L. E.	Union Railroad.	Illinois Central.	Lehigh Valley.
uilders..........	Pittsburg	Pittsburg	Brooks.	Baldwin.
ze of cylinders..	24 x 32 in.	23 x 32 in.	23 x 30 in.	18 and 30 x 30 in.
tal weight.....	250,300 lb.	230,000 lb.	232,200 lb.	225,082 lb.
eight on drivers.............	225,200 lb.	208,000 lb.	195,200 lb.	202,232 lb.
otal weight of engine and tender..........	391,400 lb.	334,000 lb.	364,900 lb.	346,000 lb.
ractive power based on 25 per cent of adhesive weight	56,300 lb.	52,000 lb.	48,300 lb.	50,558 lb.
et hauling capacity on level at 10 miles per hour...........	7,847 tons.	7,261 tons.	6,717 tons.	7,049 tons.
atio of tractive power to adhesive weight	4	4	4	4
rcentage of efficiency	100	92.5	85.6	89.8

The mathematics of this locomotive are: Cylinders, 23 inches by 30 inches stroke; the driver are 57 inches, or nearly 5 feet in diameter; the boiler front end is 82 inches in diameter; the weight on the drivers is 193,200 pounds, on the trucks, 39,000 pounds, total engine weight, 232,200 pounds; the tender load is 132,700 pounds; the manufacturing company is the Brooks; the total weight of the engine and tender is 364,900 pounds; the tractive power, based on 25 per cent of adhesive weight, is 48,300 pounds, and the net hauling capacity on the level is 6,717 tons.

This locomotive will easily haul sixty loads under oirdinary conditions and sixty-five or more under extraordinary conditions. The Pittsburg, Bessemer and Lake

Erie road has secured two larger engines of the same consolidation type. They have a total weight of engine and tender of 391,400 pounds, or a weight on drivers of 225,200 pounds and on truck wheels of 25,100 pounds, or total engine weight of 250,300 pounds; the cylinders are 24 inches in diameter and the piston stroke 32 inches; the diameter of the drivers is 54 inches; the working pressure of the boilers is 220 pounds; the fire-box has a length of 132 inches, a width of 40¼ inches. These locomotives are to be used in ore and iron traffic, their duty being to haul great train loads at moderate but regular speed.



THE LARGEST LOCOMOTIVE IN THE WORLD.

Owned by Pittsburg, Bessemer & Lake Erie road. Can haul eighty loaded cars of freight over a thirt six foot to the mile grade.

Mountain Giants.

The Union Pacific has secured some monster engines, having a total weight of 334,000 pounds each and with great capacities for work on the mountai grades of the line. The Northwester the Burlington and the Rock Island rai roads are making extensive additions big locomotives to their systems, some f freight hauls and others for passeng traffic. That the biggest locomoti which can be safely and economicall handled has yet been constructed maste mechanics do not believe. The limit li is some distance away, but with the wes ern roads pushing fast to reach it. Th master mechanics of a number of road have commissions from their companies t exert themselves in devising plans fo improved locomotives of a maximu capacity, and they are working each t outstrip the other. The tendency of th time in this direction is not so muc toward high-speed locomotives as fo those having great hauling capacity.

BUSHMEN.

Strange Aboriginals of Africa—Semi-Savage Tribes—They Live in the Interior—Strange Habits and Customs.

THE Bushmen of Africa are also called San. The language of the San is evidently a sister branch of the Khoikhoin, the name applied to the Hottentots. It is poorer and less regular in grammatic forms than the Khoikhoin language, but richer in clicks. The dialects diverge considerably. The Bushmen are known by different names, according to the Bantu tribes, on whose skirts they live. Thus they are known to the different tribes as Aba-tua, Ba-rua. The names Ba-tua, Ba-kua, and Ba-tshua are most generally given to the Pygmies and Bushmen from Galla-land to the Cape. Owing to the fact that the Pygmies and Bushmen speak the dialects of their Bantu neighbors, most of the Pygmy vocabularies given by travelers are

A TRIBE OF BUSHMEN OF THE INTERIOR OF AFRICA.

Having a dialect peculiar to themselves. They are composed of many tribes.

Bantu. The principal Bushmen tribes are the Ba-Bumantsu in Basutoland; the Ba-Lala in Bechuanaland; the Ma-Denassana, serfs of the Ba-Mangwato, of Chuana stock; the Ma-Sarwa in the Kalahari desert; the Ba-Kankala in the Kunene valley; and the Ba-Kasekele northeast of them. It is not yet settled whether the Ba-Kuise, Ba-Kuando and Ba-Koroka, near Mossamedes, southern Angola, are Bushmen or degenerated negroes.

WEIGHTS AND MEASURES.

STANDARD of measure is a brass scale 82 inches in length, and the yard is measured between the 27th and 63d inches of it, which, at temperature of 62 degrees, is a standard yard.

LINEAL.

12 inches = 1 foot.
3 feet = 1 yard.
5.5 yards =1 rod.
40 rods = 1 furlong.
8 furlongs =1 mile.

GUNTER'S CHAIN.

7.92 inches = 1 link.
100 links = 1 chain, 4 rods, or 22 yards.
80 chains = 1 mile.

ROPES AND CABLES.

1 fathom = 6 feet.
1 cable's length = 120 fathoms.

Standard gallon measures 231 cubic inches, and contains 8.338,582,2 avoirdupois pounds, or 58.372 Troy grains of distilled water, at temperature of its maximum density, 39.10, barometer at 30 inches.

Standard bushel is the Winchester, which contains 2,150.42 cubic inches, or 77.627,413 pounds avoirdupois of distilled water at its maximum density. Its dimensions are 18.5 inches diameter inside, and 8 inches deep; and when heaped, the cone must not be less than 6 inches high, equal 2,747.915 cubic inches for a true cone.

A struck bushel contains 1.244,45 cubic feet.

NAUTICAL.

1 ton displacement in Salt water = 35 cubic feet.

1 ton registered internal capacity = 40 cubic feet.

DIMENSIONS OF A BARREL.

Diameter of head, 17 inches; bung, 19 inches; length, 28 inches; volume, 7,689 cubic inches, or 3.5756 bushels.

MISCELLANEOUS.

1 cubic foot = 7.480,5 gallons.
1 bushel = 9.309,18 gallons.
1 chaldron = 36 bushels, or 57.244 cubic feet.
1 cord of wood = 128 cubic feet.
1 perch of stone = 24.75 cubic feet.
1 quarter = 8 bushels.
1 load of haw or straw = 36 trusses.

WEIGHT OF MEN AND WOMEN.

The average weight of 20,000 men and women, weighed in Boston in 1864, was: Men, 141.5 pounds; women, 124.5 pounds. Average of men, women and children, 105.5 pounds.

WEIGHT, FINENESS, ETC., OF U. S. COINS.

Gold.

Denomination.	Weight of Coin.		Weight of Pure Metal.
	Oz.	Grains.	Grains.
Dollar...........	.05375	25.8	23.22
Quarter Eagle	.134375	64.5	58.05
Three Dollar	.16125	77.4	69.66
Half Eagle	.26875	129	116.1
Eagle	.5375	258	232.2
Double Eagle.....	1.075	516	464.4
Silver.			
Dime.............	.080375	38.58	34.722
Twenty Cents	.16075	77.16	69.444
Quarter Dollar....	.2099375	96.45	86.805
Half Dollar	.401875	192.9	173.61
Trade Dollar......	.875	420	378
Silver Dollar	.859375	412.5	371.25

Copper and Nickel.

	Weight. Grains.	Copper. Per cent.	Tin and Zinc. Per cent.
One Cent	48	95	5
Two Cents	96	95	5
Three Cents	30	75	25
Five Cents	77.16	75	25

Standard of gold and silver is 900 parts of pure metal and 100 of alloy in 1,000 parts of coin.

Fineness expresses quantity of pure metal in 100 parts.

Remedy of the mint is allowance for deviation from exact standard fineness and weight of coins.

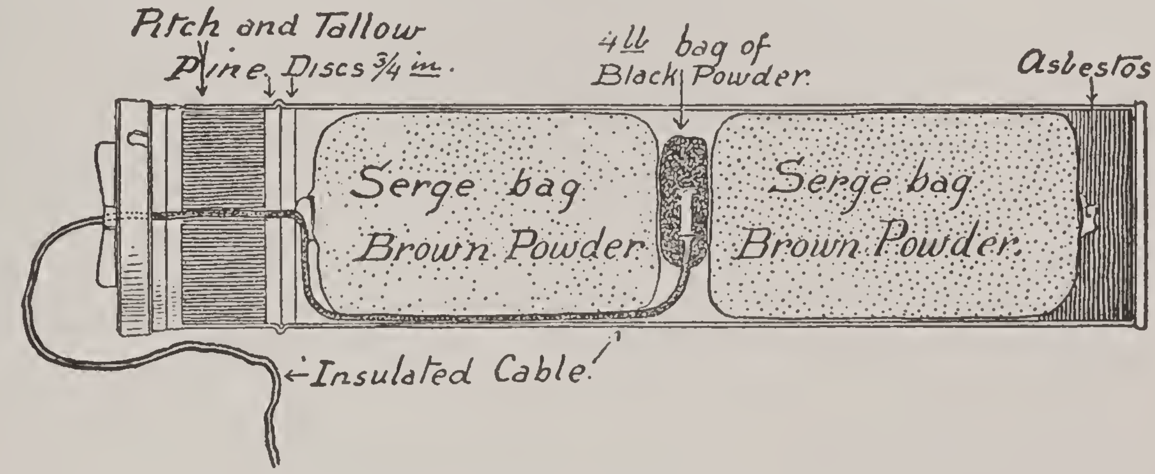
Pure gold, 23.22 grains = $1.00. Hence value of an ounce is $20.67.183+.

Standard gold, $18.60.465+ per ounce.

FIRING A BLAST.

How the Torpedo is Made—Some Knowledge of Chemicals Necessary—Much Care Required—Premature Explosions to be Feared.

IN the old days in firing a blast miners simply laid a train of powder from the charge to a safe distance, then lit this train and fled for safety. Sometimes an explosion followed and sometimes it did not. The modern method is much quicker and safer. An insulated electric cable connected with a battery located some distance from the blast is placed in a cartridge. This cartridge contains two bags of brown powder. The base of it is asbestos, to prevent the contents from being overheated during transportation. The firing end it covered with pitch and tallow and a pine disk to prevent the moisture from getting in. When it is desired to have a blast, the cartridge is inserted in a prepared hole, a key on the electric battery is touched, the electric spark flies along the cable, the powder is set on fire, and the discharge follows. These cartridges rarely prematurely explode. But, like all explosives, they must be handled with care.



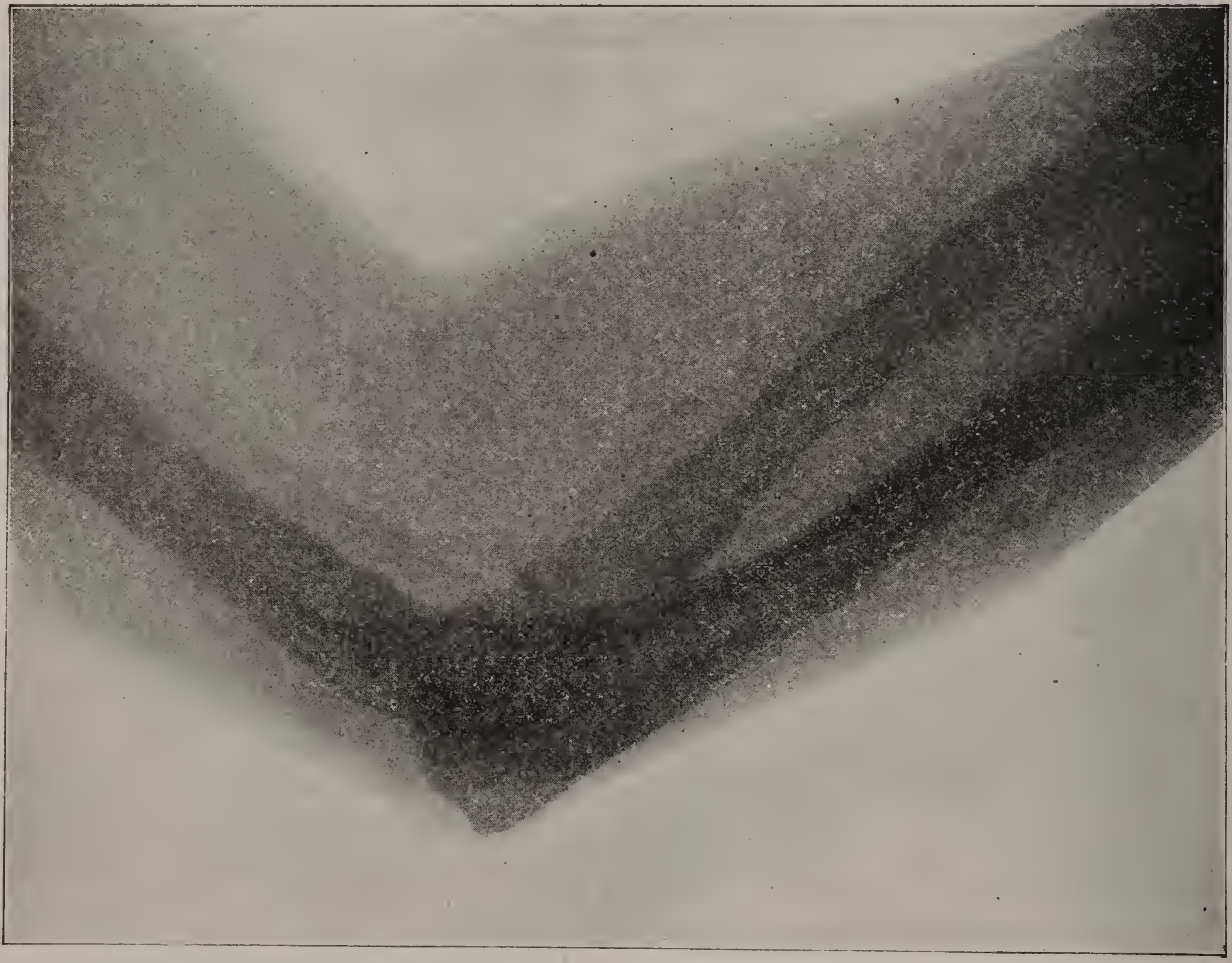
MODERN CARTRIDGE USED IN FIRING BLASTS.

It contains two bags of brown powder, the base of the cartridge being of asbestos and the firing end covered with pitch, tallow and a pine disk.

THE X RAY.

Penetrates the Body—Used by Physicians In Determining Nature of Internal Troubles—Apparatus Used.

FOR years it was difficult for science to determine the exact nature of internal ailments of human beings. Until recently it has not been possible for the physician to see the interior of the lungs, to trace the final location of a bullet, to determine just where a bone was fractured, to find lesions, or muscular troubles. It it now possible to examine the internal structure of the body through the discovery of the Roentgen X-ray. This is nothing more or less that a powerful electric light forced by apparatus through the body so that the interior is revealed to the naked eye. It has been possible to use the X-ray so that a bullet lodged in the heart of a man was not



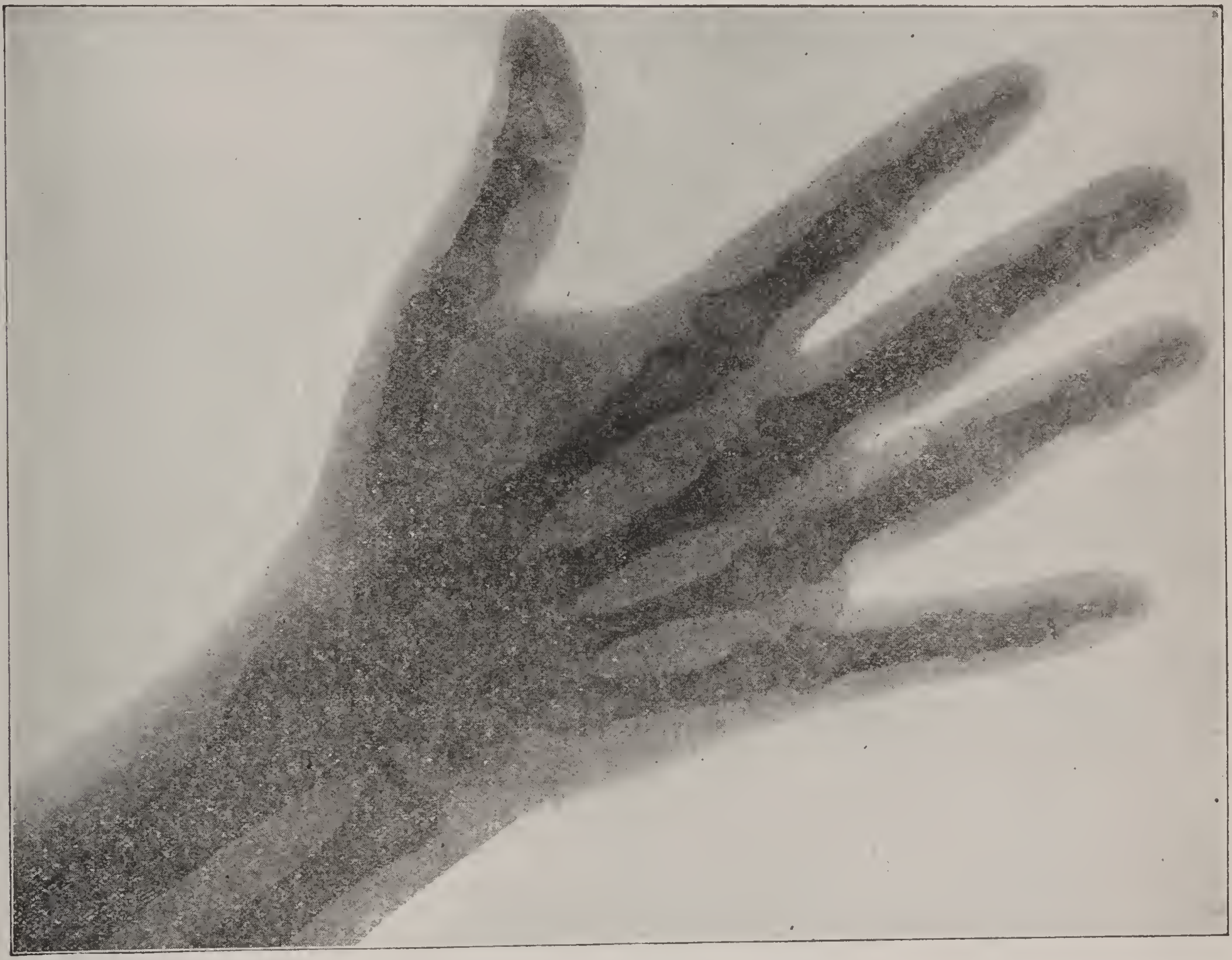
AN X RAY OR ROENTGEN RAY.

Upon the bones and joint of the arm, showing the elbow socket and covering of flesh.

only photographed before it was removed, but was then taken out and the man still lived. This operation was performed in Chicago three years ago.

Broken ribs have been discovered with this powerful light, and the location of pins and needles which have got into the body somehow. The condition of the lungs may be determined and foreign growths be found. The use of the X-ray is not objectionable nor painful to the patient, and has advanced the art of surgery a thousand years. It is one of the most wonderful discoveries of the nineteenth century, and is now used in all of the principal hospitals of the United States and Europe.

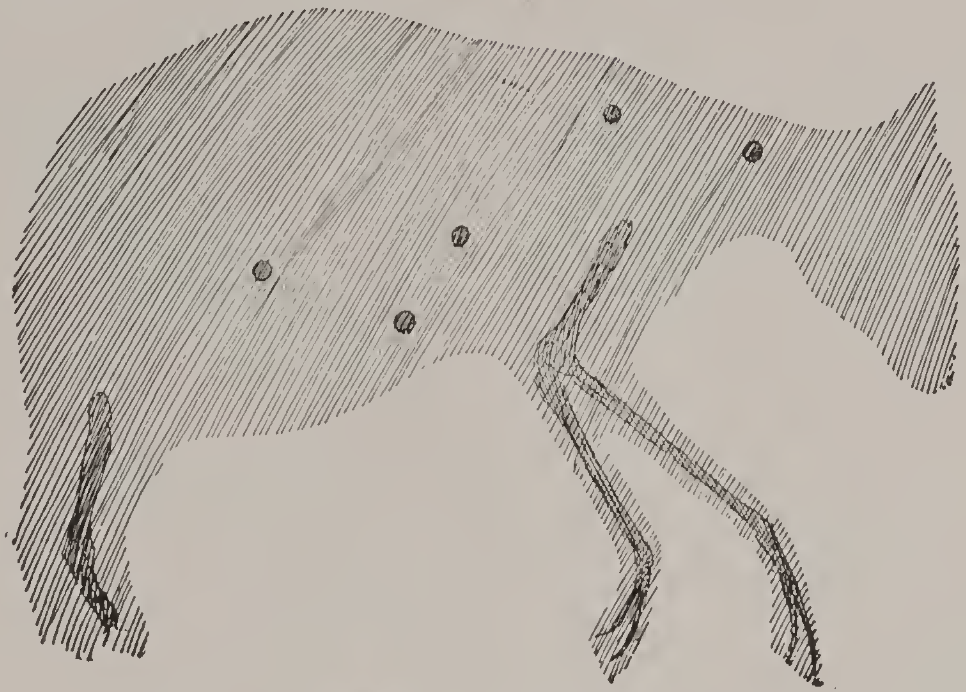
For developing the electrical force necessary to produce the X or electrical ray a static electric machine may be used. The current developed is passed through a Crookes' tube, which is applied to that part of the body desired to be illuminated. Over the part of the body illuminated by the ray is placed a flouroscope. This flouroscope is nothing more than a photographer's cap which fits closely to the eyes of the operator and shuts out light. The operator is then enabled to see the illumination upon the body of the patient and to examine the desired parts. The static electric machine when developing the X-ray is making from 1,200 to 1,500 revolutions per minute. In the first use



THE ROENTGEN OR X RAY.

Showing how it reveals the bones and joints of the hand and wrist. The shadow seemingly upon them is the flesh.

made of the X-ray there was great danger of severely burning the patient with the electrical current developed. This has now been obviated through the use of the static machine. The Crookes' tube was invented by Sir William Crookes of England. He was a noted chemist. He discovered thallium in 1861, and invented the radiometer in 1874. He was knighted by the queen in June, 1897. It is now possible with the X-ray, if a person has swallowed a button, or a bone is lodged in the throat, or foreign and injurious substances are introduced into the body, to readily see the same and to remove them with less injury to the body than ever before.



PHOTOGRAPH OF A SHOT INSIDE OF A RAT'S BODY

DENTAL SURGERY.

Importance of Care of Teeth—Effects of Bad Teeth—Dental Surgery a Science.

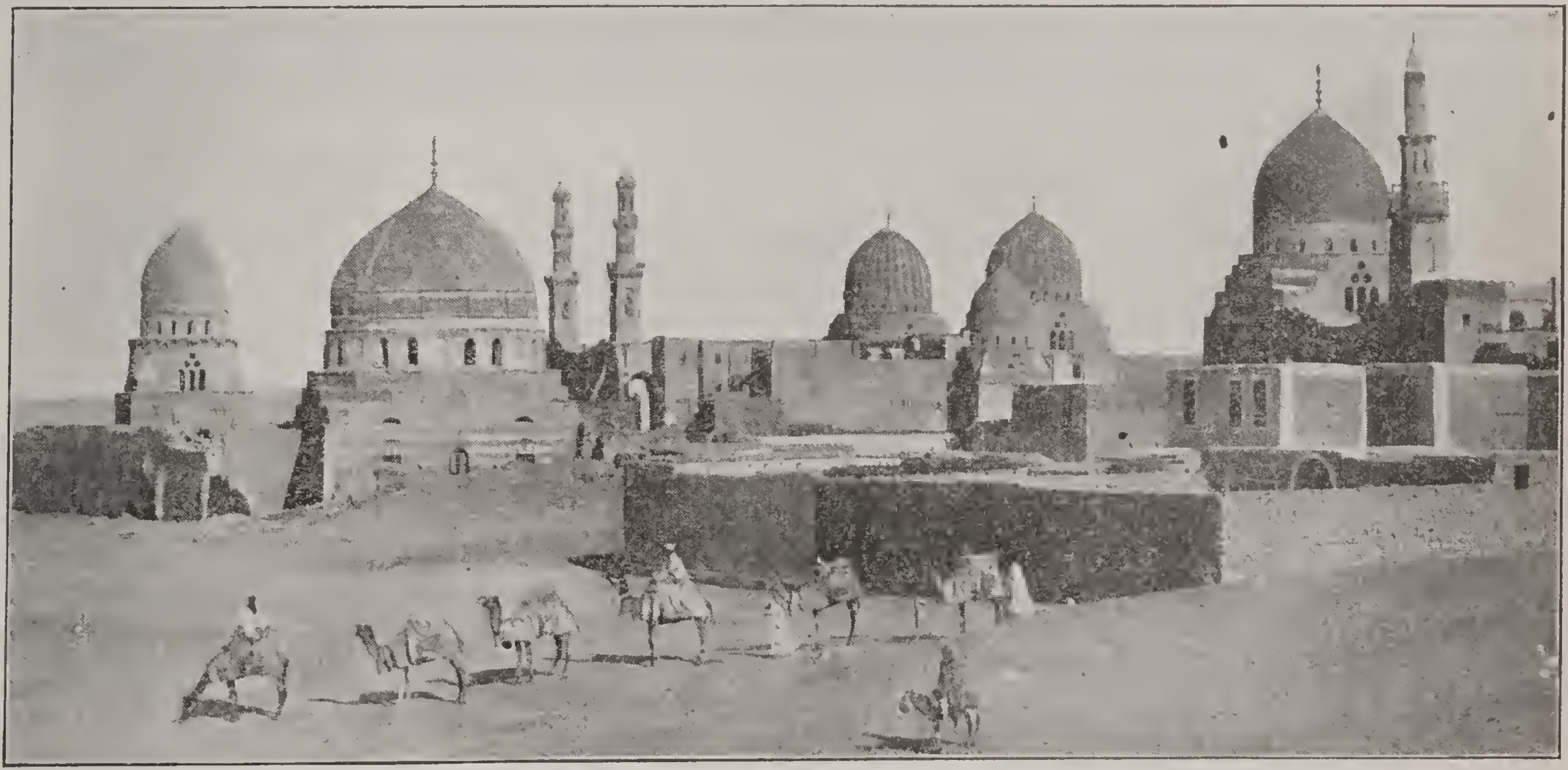
THE care of a mouth is now considered to be one of the first duties of a human being. It is known that a bad condition of the teeth seriously disturbs the stomach, may affect the eyesight, may injure the hearing, produces headaches, and often leads to general bad health. Dental surgery is becoming a science of the first class, and it is now possible to have much of the mouth treated with very little pain on the part of the patient, or any of the excruciating shocks of olden times. Large dental schools are to be found in all of the great cities, and in these students work learning the structure of the mouth and how to extract or rebuild the teeth.

They take the same kind of a course of study one would in mastering any other profession in college, and when graduated receive diplomas. Many of these dental schools contain 400 or 500 pupils. But as every person in ordinary health has thirty-two teeth in his head, it can be understood that the supply of good dentists is rarely too great. The people of the United States are said to put more money into their teeth than any other people in the world. Among the poor in Europe dentistry has made very slow progress.

BAGDAD.

Once a City of Great Importance—The Center of Arabic Culture and Learning—An Important Commercial Point.

BAGDAD, the Persian name meaning "Gift of God," is the capital of the province of Bagdad. The province of Bagdad is located in the lower valleys of the Euphrates and Tigris, between Persia and Arabia. The city of Bagdad was formerly an important one, and is still quite a commercial point. It was founded in 762 by Abu Jaffar, called "Al-Mansur," "the Victorious." Abu Jaffar was the second calif of the dynasty of the Abbassides, and Bagdad remained the capital of the Abbassides for five hundred years. During that time it bore the name Mansurijeh, also Dar-es-Selam, meaning "Dwelling of Peace." Under the Abbassides it became the center of Arabic learning and civilization, and the glory of the eastern world. When it was most prosperous, its walls harbored as many as a million and a half of people. With the fall of the Abbissides dynasty, Bagdad declined and fell into the hands of the Mongols in 1258.



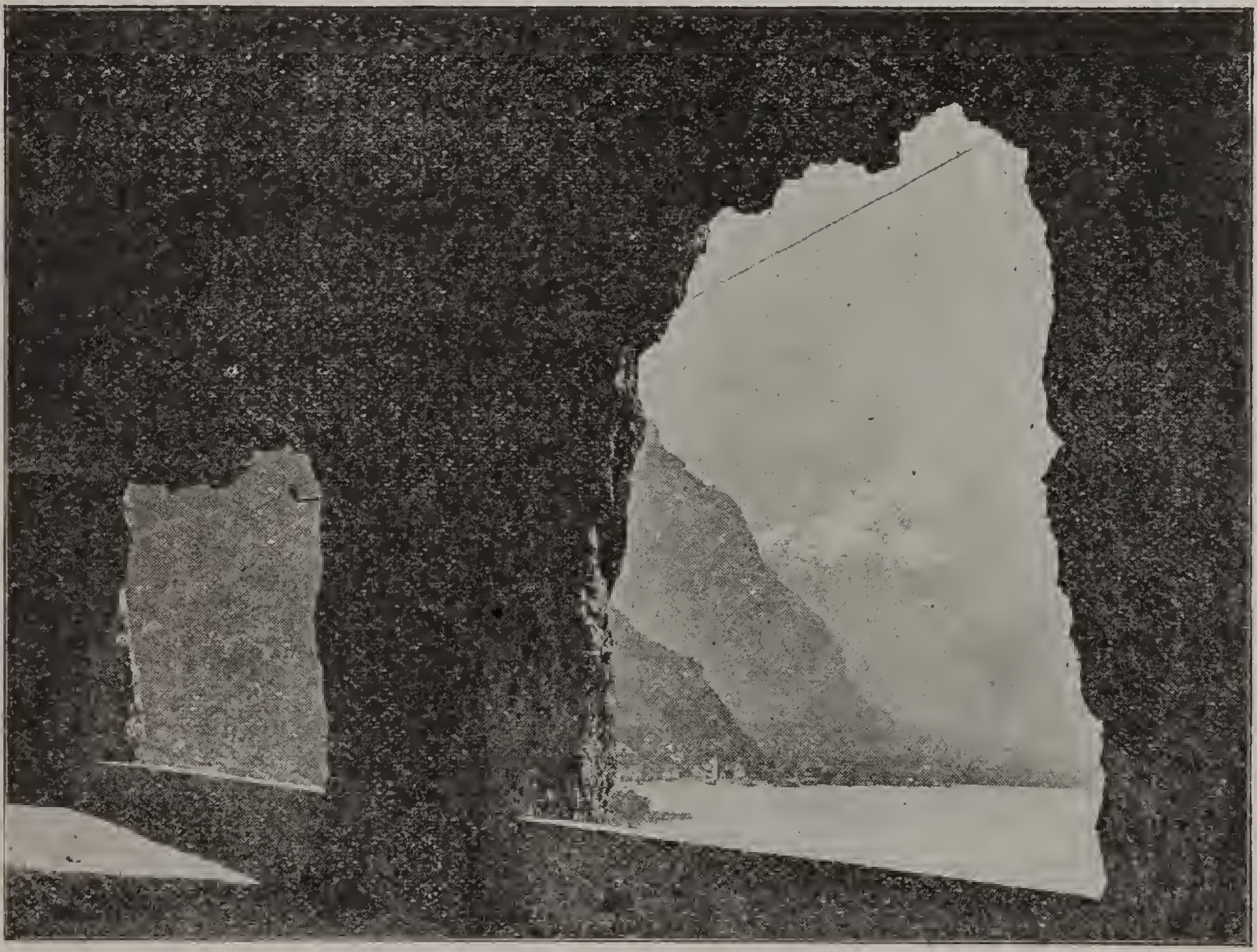
TOMBS OF THE CALIPHS OF BAGDAD, AT PORT SAID, ARABIA.
Just on the Suez Canal, and Caravans in the foreground entering the desert.

THE ALPS.

The Most Extensive of Europe's Mountain Systems—Ancient and Modern Divisions—Some High Peaks.

THE most extensive mountain system in Europe is the Alps. It comprises a part of south-eastern France, a part of northern Italy, a part of southern Germany, the western part of Austria-Hungary, and most all of Switzerland. The ancient division of the Alps were the Maritime, Cottian, Graian, Pennine, Rhaetian, Noric, Carnic, Venetian and Julian Alps. It is now divided into Western, Central and Eastern Alps. The western Alps include the Ligurian Alps, Maritime Alps, Cottian Alps, Graian Alps, Montagues des Maures and Esterel Mountains, Mountains of Provence, Alps of Dauphine, Limestone Alps of Savoy, and the mountains of Chablais and Faucigny. The central Alps include the Pennine Alps, Lepontine Alps, Rhaetian Alps, Otzthaler Alps, Bernese Alps, Fribourg Alps, Emmenthal Alps, Urner and Engelberg Alps, Todi range, Schwyzer Alps, St. Gall and Appemzell Alps, Vorarlberg and Allgau Alps, North Tyrolese, and Bavarian Alps, Luganer Alps, Bergamasker Alps, Ortler Alps, Nonsberg Alps, Adamello Mountains, and Tridentine Alps. The eastern Alps include the Zillerthal Alps, Hohe Thuern, Niedere Tauern, Carinthian and Styrian Alps, Styrian Nieder Alps, Kitzbuhler Alps, Salzburg Alps, Upper Austrian Alps, North Styrian Alps, Lower Austrian Alps, Lessinian Alps, Cadoric Alps, Venetian Alps, Carnic Alps, Karawanken, Bacher and Santhaler Alps and Julian Alps.

There are also va-



GALLERY OF THE AXENSTRASSE, SWITZERLAND.

Looking toward Flulen, a natural cavern in the mountain side, much resorted to by tourists.

rious outliers of the system in Hungary and Croatia. The length of the range from the Pass of Giovi, north of Genoa, to Semmering Pass is over 600 miles, and its width is from 90 to 180 miles. Its highest peak is Mont Blanc, 15,781 feet, on the borders of France and Italy; its average height is about 7,700 feet. Its largest glacier is the Aletsch, about thirteen miles long.

BASCULE BRIDGES.

Materials Used in Bridge Construction—The Largest Stone Arch Known—The Bascule Bridge Proper.

BRIDGES are made of various materials, principally stone, iron and wood, and in a great variety of forms. In an arch, or arched bridge, the passage or roadway is carried by arch or arches, which are supported by abutments or by piers. Such bridges are constructed of brick, stone, iron, steel or wood. Brick is seldom used alone, except for comparatively small spans and for unimportant work when stone cannot readily be obtained. In more important work it is often combined with stone, which is introduced to bind, to distribute pressure, to protect the more exposed portions, and for architectural effect. Stone, wherever it can be used, is the most valuable material, on account of its massiveness, stability of form and resistance to the elements. It is, however, inferior to iron in economy, facility of construction and ready adaptability to various situations.

A ROPE BRIDGE OF THE ANDES MOUNTAINS, SOUTH AMERICA.

Held in place by guy ropes and spanning a deep gorge. Constructed by natives.

Among the finest monuments of antiquity are ranked the remains of Roman arched stone bridges. The largest stone arch known is that of the bridge of the Washington aqueduct over the Cabin John Creek ; span, 220 feet ; rise, 57.25 feet. The first arched bridge built of iron was erected over the River Severn, in England, and consists of five parallel ribs of cast-iron, with a span of 100 and a rise of 40 feet. The Southwark bridge over the Thames at London, the central one of the three arches of which has a span of 240 with a rise of 24 feet, formerly ranked as the largest iron arched bridge ; but this span has since been more than doubled, as notably in the bridge over the Mississippi at St. Louis, and the Washington bridge over the Harlem River in New York.

Arch Beam Bridges.

In an arched beam bridge arched beams in compression constitute the principal members and sustain the load. The beams are sometimes built of parallel layers of planks, which are made to break joint. In the more important constructions the arches are often compound. They have been employed in modern bridges of considerable magnitude. An arched-truss bridge is a form in which the compression member is an arched beam, as in the McCallum truss. In a beam-truss bridge the load is supported by beam-trusses or openwork beams. A compression-cord and a tension-cord are essential, and the stresses are transferred from one to the other on their way to the points of support by means of struts and tension-bars, which together are called web-members.

A bascule bridge is a drawbridge arranged with a counterpoise, so that a the floor of the bridge is raised the counterpoise descends into a pit prepared fo it ; the commonest form of medieval drawbridge.

Movable Bridges.

Swing bridges are by far the most commonly employed of movable bridges The large rivers to be crossed in America have demanded swing bridges of grea span, with excellent contrivances fo minimizing friction and insuring steadiness when closed. The swing bridge over the Raritan, in New Jersey, allows two free passages, each 216 feet wide. It is what is known as a double swing bridge—the bridge being balanced on a central pivot assisted by a system of rollers—opening and closing the two passages at once, and affording two passages instead of only one, as in the earlier bridges, which were generally made in two leaves to cross single passages. The Kansas City Bridge crosses two passages, each 160 feet wide. The total moving weight is 303 tons. The bridge is opened by steam power in about one minute and a half, or by manual power in two minutes. From two-thirds to three-fourths of the moving weight rests on the central pivot.

Movable bridges, sometimes called telescope bridges, capable of being rolled horizontally backward, or in an oblique direction, are occasionally employed. The bridge across the Arun, near Arundel, is 144 feet long. It is traversed on wheels and acts as a sliding cantilever, the overhanging portion resting on the opposite abutment when in place.

THE SUEZ CANAL.

First Conception of the Canal—Error Made in Calculation—De Lesseps' Undertaking a Success—Cost and Extent of Canal.

THE Suez Canal connects the Mediterranean with the Red Sea. It was the idea of Napoleon the First to build a canal connecting these two seas, but he abandoned it with the report of the engineer Lepere in 1798, who placed the surface of the Red Sea nearly thirty feet higher than that of the Mediterranean In 1841 this error was corrected by British officers, and in 1849 Ferdinand de Lesseps began a thorough investigation of the isthmus.

Obtaining the consent of the Khedive of Egypt and the Porte, he organized the Universal Company of the Maritime Suez Canal in 1856. Half the capital of this company was raised by public subscription in Europe, chiefly in France, the other half was furnished by the Khedive of Egypt. April 25, 1859, work was commenced on the canal, and November 16, 1869, it was opened for navigation. The work of construction cost about $100,000,000. The canal is 100 miles long, traverses Lake Menzaleh, Lake Timsah, and

PORT SAID SHOWING THE SUEZ CANAL.

This canal connects the Mediterranean and Red Seas, is 100 miles in length and cost $100,000,000.

Bitter Lakes, and was originally from 150 to 300 feet wide at the water surface and 72 feet wide at the bottom, with a minimum depth of 26 feet. Since 1886-1890 it has been deepened to 28 feet and considerably widened. In 1875 the British government purchased of the Khedive his shares in the Universal Company of the Maritime Suez Canal.

The following table shows the increas in the number of vessels passing throug the canal and the receipts of the company

Year.	No. of Vessels.	Tonnage.	Receipts
1870..........	486	654,915	$ 1,031,86
1880..........	2,026	4,344,519	8,147,88
1890..........	3,389	9,749,129	13,402,18
1894..........	3,352	11,283,855	14,755,36
1895..........	3,434	11,833,637	15,620,74

HISTORY OF AMERICAN FLAG.

Resolutions Adopted by Congress—What Stars and Stripes Mean—First Adoption.

JUNE 14, 1777, Congress in session at Philadelphia, adopted the following resolution:

"Resolved: That the flag of the thirteen United States be thirteen stripes, alternate red and white; that the union be thirteen stars, white in a blue field, representing a new constellation."

The idea of the thirteen stripes was not entirely new, for the Philadelphia Light Horse had used it in the early part of 1775, and at Washington's headquarters at Cambridge, when he took charge of the army, January 2, 1776, there was in use a flag with thirteen stripes just as they are to-day. There is no record, however, of the white stars in a blue field prior to the resolution of June, 1777.

It is not known just to whom credit is due for designing the American standard, but the descendants of Mrs. John Ross, of Philadelphia, assert that she, with the aid of General Washington, first combined the stars and stripes after a design drawn at her suggestion by him. The flag was not officially ordered by the Secretary of State until Sept. 3, 1777, but it is known that the stars and stripes were born by the victorious American army in the Battle of Brandywine, and was ever after carried by the American forces.

The Ranger, commanded by Capt. John Paul Jones, was the first American ship bearing the flag of the Union to receive the salute of a foreign power. The salute was paid by the French, February 14, 1778. April 4, 1818, after a number of new States had come into the Union, Congress passed a law by which, on the admission of every new State, one star was added to the union of the flag.

RAISING OF CHICKENS.

The Business Has Become Profitable—The Incubator and its Wonderful Results—Heating by Hot Water and Hot Air—Winter Care of Fowls.

OF recent years the business of raising chickens and other fowl has assumed proportions throughout the country that bids fair to rival many of the great industries of the agricultural districts. With the modern incubator the work of the poultry farmer has been greatly facilitated, and the art, for such it may be called, is made much more tempting from a financial point of view.

The practice of artificially hatching chickens has been in vogue in Egypt for a couple of centuries. The American inventor, however, has greatly simplified the process. There are two classes of apparatus to-day—one heated by hot water and the other by hot air. The eggs are put on trays and placed in the incubator directly beneath the tank which furnishes the heat. These artificial hens are built double-walled and the intervening space is packed with asbestos to prevent a sudden change in temperature from affecting the inner chamber. The capacity of incubators ranges from 25 eggs to 600, and the manipulators are most successful during the fall and spring, the hot months presenting unprofitable results.

It requires twenty-one days for eggs to hatch, and the temperature is maintained at 103 degrees. After hatching, the chickens are permitted to remain from twenty-four to thirty-six hours in the incubators to dry, and are then transferred to brooders, which hold from 100 to 3,000 chickens. On some farms the chickens are retained in the brooders until ten weeks old. The hatching of chickens is the easiest part. It is the watching necessary to bring the chicks to a marketable age that is the greatest labor.

Real estate is an important factor in poultry farming. Much may be obtained from twenty acres of ground. It is not advisable to put more than one hundred and forty chickens on an acre. This may be divided into four yards with about thirty-five in each yard. Adjoining each should be a scratching-shed, ten by fourteen feet, under which the chickens may exercise. During the winter the floor should be covered with three inches of hay and the grain thrown on this, thus forcing the chickens to exercise in order to get their food. With existing conditions to-day the farmer may get all the eggs from a hen in two years while it formerly took five years. The most experienced managers of chicken farms so feed and condition their poultry that the hens begin laying during the early fall, just at the time that eggs will bring the highest price, and at the end of the second winter they are fattened and sold.

THE STEEL CITY.

Pittsburg, an Important City—Composition of Steel—Methods of Treating the Metal.

PITTSBURG, the city of steel, so called from its iron and steel manufactures, is the second city in the State of Pennsylvania, and situated in Allegheny County, at the junction of the Monongahela and Allegheny rivers. It is the leading city in the United States in iron, steel, copper, brass and glass manufactures. It is an important railroad point, headquarters of a river trade, and exports coal, coke, petroleum, etc.

AN OPEN HEARTH FURNACE USED IN MAKING INGOTS OF STEEL.

The illustration shows a large bucket filled with molten metal being poured into the furnace for reheating or fusing.

Steel has been known from early times, but its origin is not known. It has been in use in India for a long time, and is still manufactured in that country by methods similar to those in use long ago. Steel is a form of iron, not occurring in nature, but manufactured, in which the amount of carbon is intermediate between that in wrought and that in cast iron, and this carbon does not exist in the steel in the form of graphite.

Since steel is intermediate between wrought and cast iron in the amount of carbon which it contains, it may be made either by carburizing the former or decarburizing the latter. Carburization is one of the oldest methods. Though differing in details, in the essentials it is practically the same process by which Indian wootz is manufactured. By this method known in 1722 blister steel is obtained, and this is further worked up into spring, shear and double-shear steel by one or more processes of fagoting, welding and hammering or rolling, the object of this being to give the metal greater homogeneity. A great addition to the value of this process was the invention of Huntsman in 1740, of cast-steel, the product of fusion in crucibles, under suitable manipulation, of blister steel, which process is still in use as first arranged almost without change.

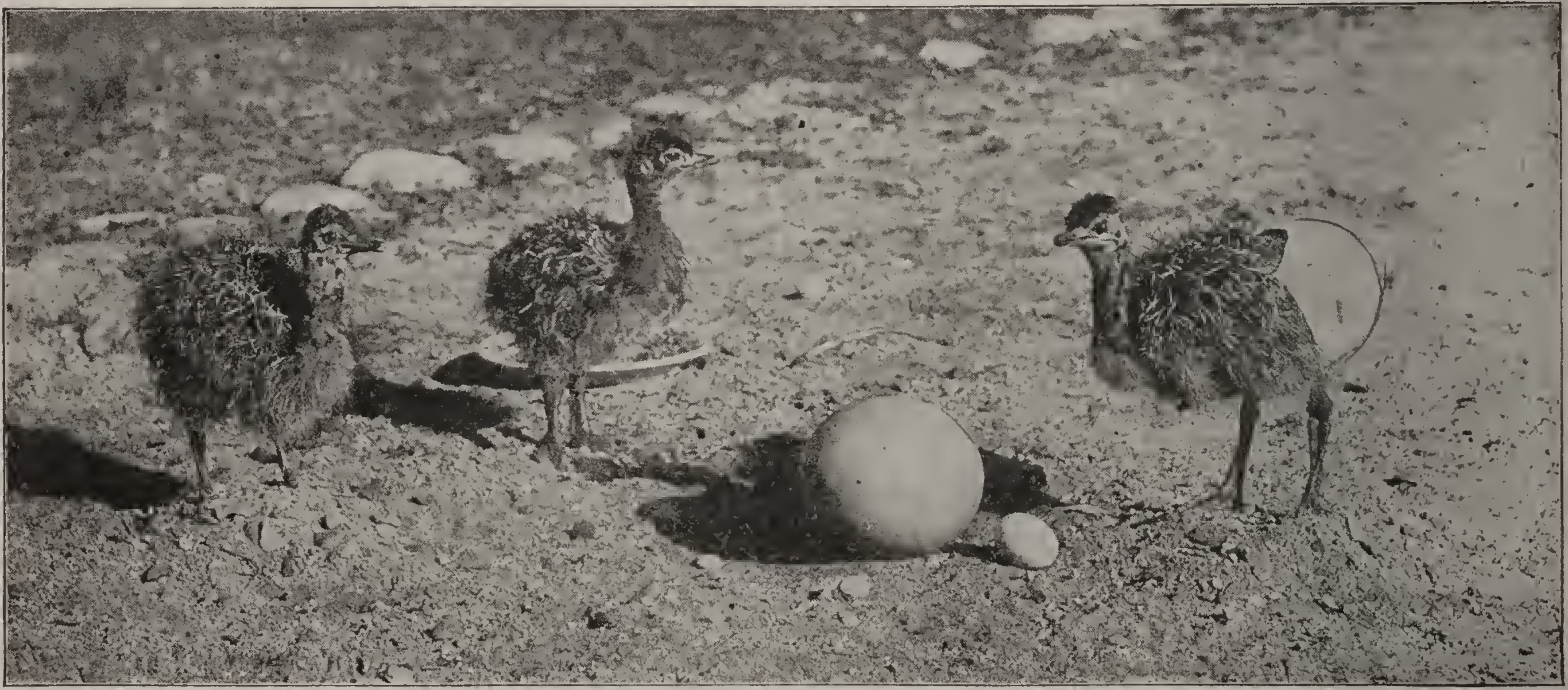
By this method when iron of a sufficiently high grade is used, the finest quality of steel is produced, and it is only steel manufactured in this way which can be used for the best tools, weapons and cutting instruments of all kinds.

The methods of producing steel by the decarburization of pig-iron are numerous and varied. The process known as the "Siemens," the "Martin," and the "Siemans-Martin" are most extensively employed. The steel made by any of these processes is generally called "open-hearth steel," the pig-iron being decarburized in the openhearth regenerative furnace. The most important process is the "Bessemer," invented by Sir Henry Bessemer about 1856, which consists of blowing air through molten pig-iron in a "converter," or vessel lined with a refractory material.

THE OSTRICH IN AMERICA.

They are Raised in California—Three Farms Make a Profit Out of Them—May Be Hitched Like Horses—What Is Done with Chickens—Weight of Grown Bird.

VERY little is known in America about the ostrich, although there are, in this country, three farms on which these birds are raised. Many opinions which have been cherished from childhood about the ostrich are mere fabrications. There is no truth in the synonym frequently used: "Like an ostrich which thinks itself safe because its head is buried in the sand."



"JUST OUT," NEW BORN OSTRICH CHICKS.

Hatched in the sand by the heat of the sun's rays. The only ostrich farm in this country is at Pasadena.

The three farms in this country are a source of much profit to the owners and also a great curiosity to visitors. The largest of these farms is located at Norwalk, eighteen miles from Los Angeles. This is the only farm on which the birds have been imported directly from Africa. The farm was stocked in 1886 with forty-two birds, which were transported from their native land in a ship chartered especially for the occasion. A grea many of the birds died en route. This together with the fact that most of the birds have just started to lay, accounts for the comparatively small output of the farm.

The best feathered birds are usually paired off for breeding purposes and penned in separate corrals, five of which cover an acre. During the laying season these birds are vicious, and the attendants never dare to enter the corrals. Ostriches can strike a powerful downward blow with their feet and have been known to have permanently crippled horses.

After the ostrich hen is three or four years old and when the rainy season is over she begins to lay in a sand hole three feet in diameter and one foot deep. To protect the eggs from the sun's heat she covers them with sand, which perhaps has given rise to the sand theory. The male birds do most of the work. They sit on the eggs from 5 o'clock in the afternoon until 9 o'clock in the morning, when they are relieved by the females.

The chicks are taken from the parents as soon as hatched. In this way two sittings a year are obtained,—a system more profitable than that of using an incubator. A pair of birds in their prime raise on an average of ten chicks per year. In some instances thirty-two have been taken from one pair. Ostriches over five months old, except those breeding, run in troops during the day and are corraled during the night to protect them from dogs and coyotes. The full-grown bird weighs 250 pounds, measures over seven feet in height and lives about twenty-seven years.

LARGEST LIZARD KNOWN.

THE remains of what was once the largest lizard known have been found in western Colorado by Curator E. Riggs, of the Field Columbian Museum of Chicago. The thigh bone of a dinosaur which measures 6 feet 10 inches and weighs 500 pounds. It is thought that a lizard with such a thigh bone must have been over 80 feet long and 25 feet in height. This animal lived thousands of years ago, and lived on grass and tree ferns, a true vegetarian. The partial remains of several varieties of the snake family have been recently discovered in the Rocky Mountain region, showing that the climate of this section has very materially changed. For the sustenance of these immense animals it would require thick and perpetual growth now confined to the Tropics. The part of the United States now forming the Rocky Mountain system, then must have been an immense valley filled in with great lakes and immense growths of vegetation. The upheaval resulting in the formation of the Rocky Mountain system has brought within human reach the remains recently found, from the measurements of which can be constructed models, showing size, shape and general appearance of the being itself.

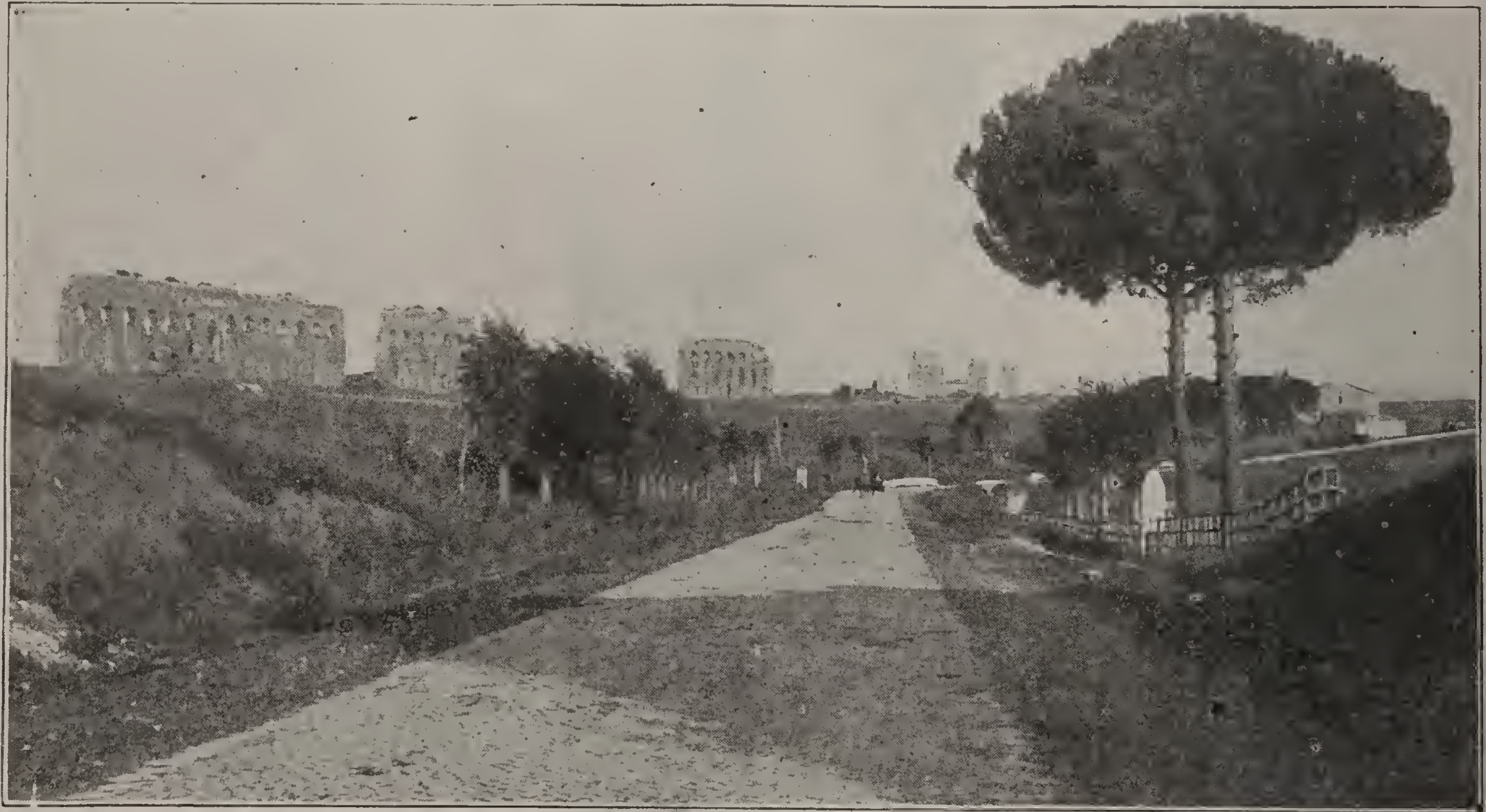
LIZARD LARGER THAN A HOUSE.

This lizard was larger than a house. It lived on grass, trees and ferns.

APPIAN WAY.

First Roman Road Constructed as a Public Work—Bordered by Many Tombs and Ruins—Pavement in Good Condition.

THE Appian way, most famous of Ancient Roman highways, extended from Rome to Brindisi, and was probably the first great Roman road undertaken as a public work. In 312 B. C. it was begun by Appius Claudius Caecus, the censor, and carried to Capua. It was next extended to Beneventum, and probably did not reach Brindisi until 244 B. C., when a Roman colony was inaugurated there. At the present time the Appian way, after it leaves Rome, forms one of the most notable memorials of antiquity in or near the Eternal City, bordered by tombs and the ruins of monumental buildings. Long stretches of the pavement remain perfect, and show that the width of the roadway proper was fifteen feet. This highway was the first of many great public highways constructed by the government of Rome immediately after the Romans were successful in their war against the Carthaginians, and had added to their territory Southern Italy. The termination of this war greatly increased the wealth of the Romans. Each free Roman was granted by the Roman Senate either a sum of money or seven jugera of land, as he elected. These newly acquired possessions consisted of public lands, valuable forests, mines, quarries and fisheries. In order to hold her new territory, however, Rome planted the Peninsula thickly with colonies, and connected them with the Capitcl by these wonderful and elegantly constructed highways.



APPIAN WAY.

Commenced in 312 B. C. Leading from Rome to Brindisi. It is bordered with Tombs and monumental ruins. Here the ancient Roman Emperors for centuries drove in their chariots decorated in costly splendor.

THE WONDERFUL ERMACK.

A Russian Vessel of Marvelous Strength—It Is Hoped She Will Yet Force Her Way to the North Pole—Manner of Construction and Method of Opening Arctic Wastes—First Suggested by American Ice Breakers.

FOR the last twenty years inventors have been endeavoring to construct steamships to navigate the Arctic waters. Few if any of these have met with success. The ussians, who have taken a most active rt in this work now have a vessel which ds fair to accomplish e feat. It is the iceeaker "Ermack."

This unique ship was ggested by the ice ushers which ply the aters of the Straits of ackinac. She is built neither cargo nor ssengers. Instead of ving a double bot- n, as most vessels are uipped with, the Er- ack has a double ame throughout. eel plates, a quarter an inch in thickness, m the epidermis, and y extend from the el to the level of the ck, forty feet above. thin this frame is other. Staunch braces of steel connect the two walls while the space between them is divided into water-tight compartments, varying from ten to three feet in diameter, and extending completely around the vessel.

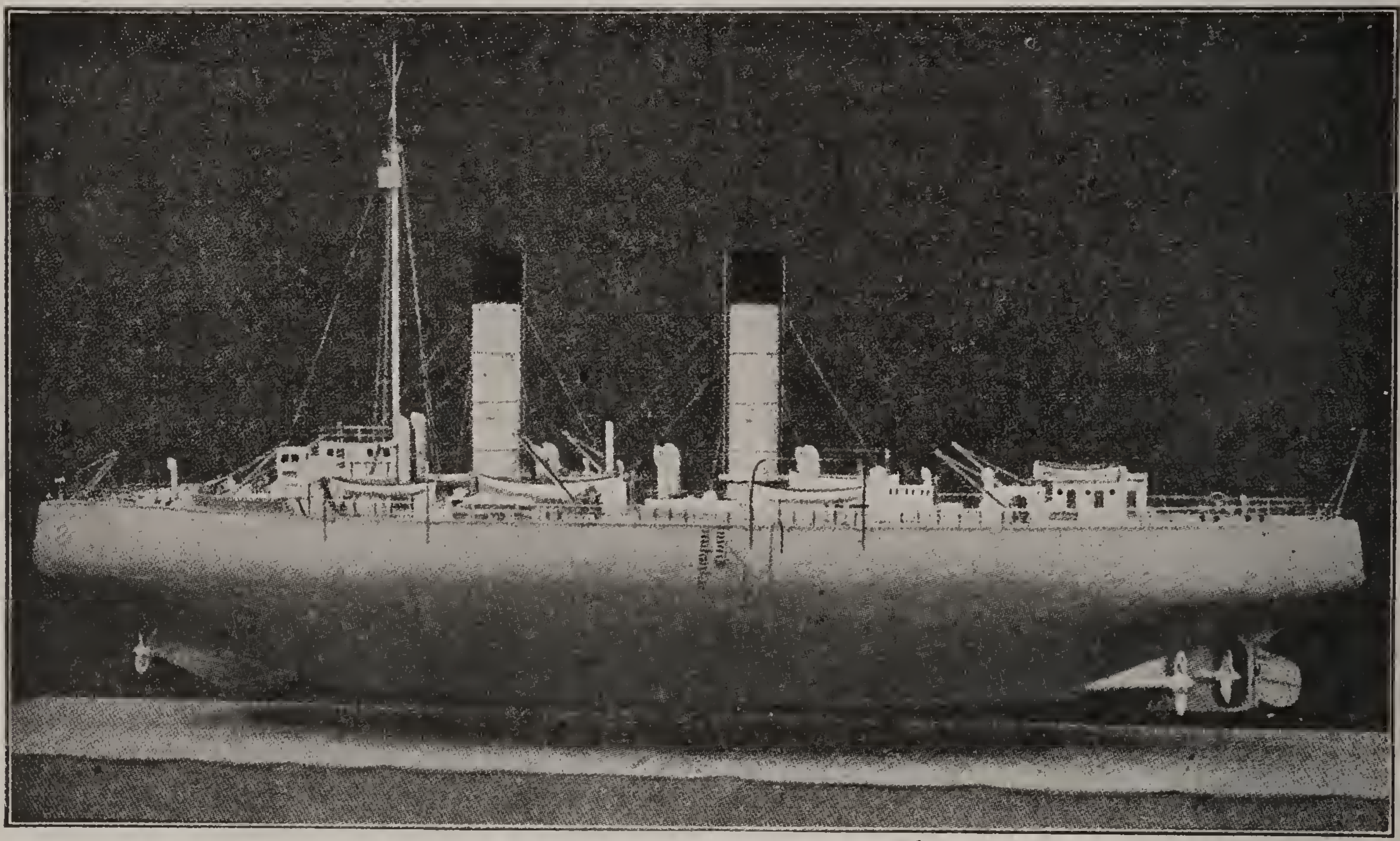
Two Ships in One.

The "Ermack" is virtually two ships in one. Her deck is double, two sets of sky-

THE ERMACK AT WORK IN ARCTIC ICE.

lights are provided, and a wooden partition incloses the cabin, regardless of the fact that the apartment itself is constructed of thick steel plates. The wooden coat is provided more with a view to warmth than durability. Heat is furnished from the ship's boilers through steam pipes which run between the inner walls. The temperature of the "Ermack's" cabin is always comfortable, as the outer air chamber prevents the heat from escaping. The ship is divided into forty-eight water-tight bulkheads, most of which extend to the deck level. After she was built these compartments were filled with water, but the vessel retained her buoyancy as gracefully as before. The provisions for strength and durability take up much room. Of the remaining space the propelling machinery, located amidships, takes up the greater amount.

Power is furnished by four propellers—three aft and one at the bow. They may be operated independently in case o accident, as they are connected with separate engines. The total horse-power o the ship is 10,000—2,500 for each propeller. The forward propeller was adopte from the ice-breakers used on the Grea Lakes. The object of this screw is t suck the water from beneath the ice i order to make the resistance less. I loose ice it may be reversed, which force small blocks of ice from the vessel' course. Cabins, scientific laboratories an quarters for officers and crew occupy the remaining space. Her bunkers carry, when filled, 3,000 tons of coal. Altogether the vessel cannot be called large, as her total displacement is but 8,000 tons.



A MODEL OF THE ERMACK.

The most powerful ice crusher in the world. She may yet reach the North Pole.

Peculiar in Appearance.

Her external appearance is as remarkable as her interior arrangement. Sharp lines mark her stern and sides. Her sides, instead of meeting the water at a angle of 45 degrees, project above it, giv-

ng her the appearance of being top-heavy.
he appears to lie upon the surface, while
s a matter of fact she has a draught of
wenty-five feet. She is 305 feet long,
nd has a beam of seventy-one feet, which
ives her a very blunt appearance. Her
peed is anything but fast. In clear water
he "Ermack" can make but fifteen knots
n hour, the pace of a heavy battleship.
he has the appearance of a stout war-
hip, and if put to the test could render a
ood account of herself, owing to her
trength.

The method of attack pursued by this
essel will seem remarkable to the unin-
rmed. It does not charge the ice barrier
irectly. Instead it pushes its prow up
e edge of the berg. With the engines
orking to their utmost, the forward part
the vessel ascends the barrier until a
ressure of 900 tons is brought to bear
pon the ice. If the resistance is still too
reat, an apparatus for adding 200 more
ns of pressure is provided. Great
umps are put to work in the hold of the
ssel which force thousands of gallons of
ater to the compartments forward until
e pressure directly over the ice reaches
100 tons. These same pumps can force
e water to different parts of the ship in
se a quick move is desired to avoid acci-
nt. At times the vessel climbs the edge
the ice until more than ten feet of that
rt usually below the water-line is visible.
hen, unless the ice be solid, the forma-
on gives away. In this manner the
aft proceeds and fairly crunches its way
rough ice fields that would prove abso-
tely impossible for ordinary vessels to
netrate. This idea of crushing the ice
not entirely new, as it is in vogue on the River Volga, the North Sea and the Great Lakes.

Mate of the Locomotive.

The birthplace of this wonder is also remarkable for the home of the first locomotive—Newcastle-upon-Tyne. She was wrought out at the yards of Sir G. W. Armstrong. When she braced the waves on her initial voyage she was named "Ermack" after the Cossack warrior who conquered Siberia. The primary object of the construction of the "Ermack" was not to aid the cause of Arctic exploration, but to open up the vast region in that vicinity to civilization and Russian capital. Russia has the longest coastline of any country in the world, but for many months in the year its ports are impassable owing to the ice. The government recognized the great loss incurred by the ice, and set about remedying the evil. The "Ermack" was the result. She was completed in February, 1900. Kronstadt was named as the destination of her first voyage. It seemed ridiculous to make the trial, but as the vessel slowly poked its nose into the harbor of that city the entire population stood on the shore and welcomed its arrival. Thus did the "Ermack" practically display its ability. Thirty ice-bound merchant vessels were freed on this trip and escorted to the harbor, one in a sinking condition.

Her next trip was in the ice fields farther north. Owing to the great depth of the ice her forward propeller was removed, as it proved a hindrance. The trip was regarded, however, as entirely successful, and a number of scientists returned from the cruise with much valuable information.

POMPEII.

An Ancient City of Beautiful Dwellings—Lack of Magnificent Civic Buildings—Some of Its Buildings.

THE ancient city of Pompeii was situated on the Bay of Naples, Italy, thirteen miles southeast of Naples, and nearly at the foot of Mount Vesuvius. It was a flourishing provincial town where many Romans lived. In 6 A. D. an earthquake severely injured th town, and in 79 an eruption of Vesuvi completely destroyed it. The site w discovered in 1748, and excavations mad

The buildings of Pompeii were modes and its private dwel ings handsome. Man antique sculptures an utensils have been e cavated from the ruin Among some of th more important an imposing structure found are the gre theater, of the tim of Augustus, semici cular in plan, with diameter of 322 fee The cavea has two pre cinctions: Below th lower one there are fo tiers or seats of hono the upper one has com munication by passage and stairs with the tr angular forum, an above it there ar raised tiers of seats f

METHODS USED IN BUILDING THE PYRAMIDS, ANCIENT EGYPT.

Upon whose work 100,000 men, women and children were engaged for years.

women and a platform for working the awnings.

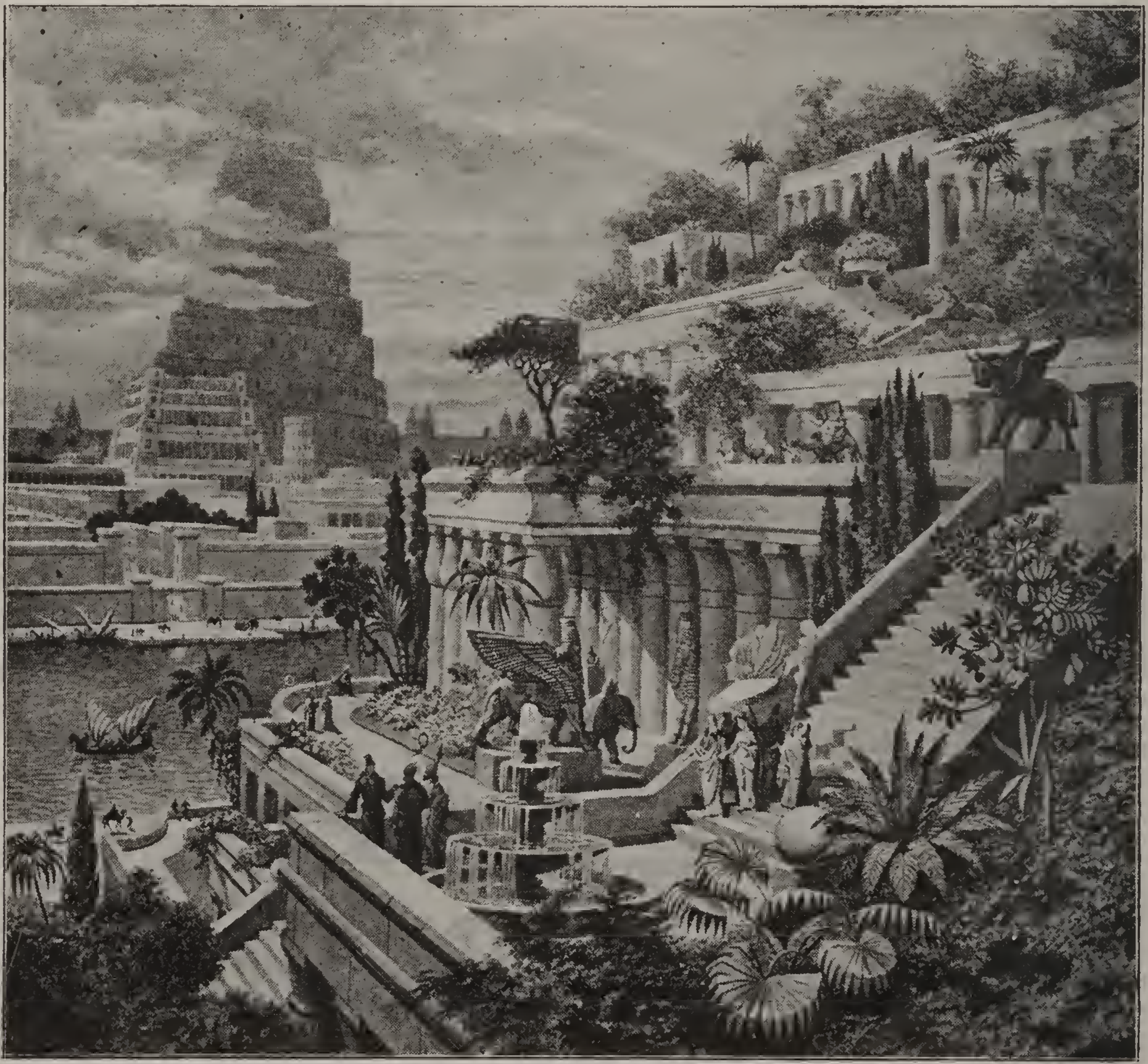
The Temple of Isis is a small tetrastyle prostyle structure raised on a basement in a peristyle court upon which open the lodgings of the priests. The house of Castor and Pollux is a double house with a large peristyle court common to the wo parts. The exterior of the house is inished with stucco decoration in panels and arabesques. The house of Marcus Lucretius is a double house of three tories. It has a beautiful reception room and dining room. The house of Meleager is noted for its paintings and decorations. The house of Pansa is one of the largest and most elaborate dwellings of Pompeii. It measures 120 by 300 feet. The house of Sallust is a large and richly decorated mansion, similar in arrangement to the house of Pansa. The house of Faun is considered to be the best in style of the ancient city. The wall paintings are replaced by Mosaics. The famous Dancing Faun and the mosaic of the Battle of Issus,

UNCOVERED RUINS OF THE ANCIENT CITY OF POMPEII.

Which was overwhelmed by the eruption of Mt. Vesuvius, 79 A. D. Archaeologists are still working in the ruins.

in the Naples Museum, came from this house.

The ruins of Pompeii have furnished us the best information we have on the material civilization of Rome. Excavations were commenced between 1808 and 1815, and have been continued since that time.



ONE OF THE SEVEN WONDERS OF THE WORLD.

The Hanging Gardens of Babylon, near the Tower of Babel. Time has destroyed this wonder. It i estimated they cost $10,000,000 to build.

Five hundred years prior to the destruction of Pompeii by the ashes and lava from Vesuvius, and probably at a time when Pompeii was the Metropolis of Southern Europe, there existed in Southern Asia the flourishing city of Babylon. From here Nebuchadnezzar ruled Babylonia during the most illustrious period in the history of that country. He built canals, reservoirs, irrigating sluices, harbors on the Persian Gulf, and mad Babylon the most magnificent city of Asia

In order to gratify his queen, Amyitis who pined for the mountains of her nativ Media, he built the celebrated Hangin Gardens of Babylon, which consisted c terraces built on arches raised high abov the city. Earth was laid on this structur and planted with trees and shrubbery On the highest levels were fountains anc cascades which nourished the plants. Ar strove to emulate Nature, and the loft rocks and various trees of this wonderfu Paradise were a pleasant change from th monotony of the Babylonian plain, anc served to remind the Babylonian Queen o her husband's love, and the beauty of he native country.

MODERN FIRE FIGHTING.

ew York Training School—How Drilled—Salaries Paid—Modern Appliances—Private Companies, How Organized and Equipped.

THE largest fire the world has ever known occurred in Chicago, October 9, 1871. The loss was 200 lives and $290,000,000 of property. Since the days of volunteer re companies, when young men were ady to exchange evening dress for the lmet and rubber coat of the fire fighter, ere have been many developments in e methods and means of combating es. The old hand-pump engine has en relegated to history, and in its stead e steam engine belches forth its watery otest to the flames. It is not improba-e that even this complicated monster of e and water may soon disappear.

In the place of the volunteer now ands the professional, who undergoes a orough training before he is admitted t service. The Firemen's Training hool, of New York, from which 40,000 en have been graduated in the past xteen years, occupies handsome quar-rs erected and equipped at a cost of ore than half a million dollars. There en are drilled in the mysteries of the ild. First comes instruction in han-ing the scaling ladder, and adroitness passing from window-sill to window-l, and knowledge of this is regarded as ghly essential and valuable in the rvice.

Then the men are taught to handle the life line. A light rope is shot to the roof, where it is seized and a heavy line drawn up by means of it and made fast. Each man is provided with a life belt, in the front of which is a "snap." A few turns of the line about this attachment relieves the fireman of all but about five pounds of pressure, so that an easy descent is possible. When the man is bringing down a helpless body or additional weight, two additional turns are necessary.

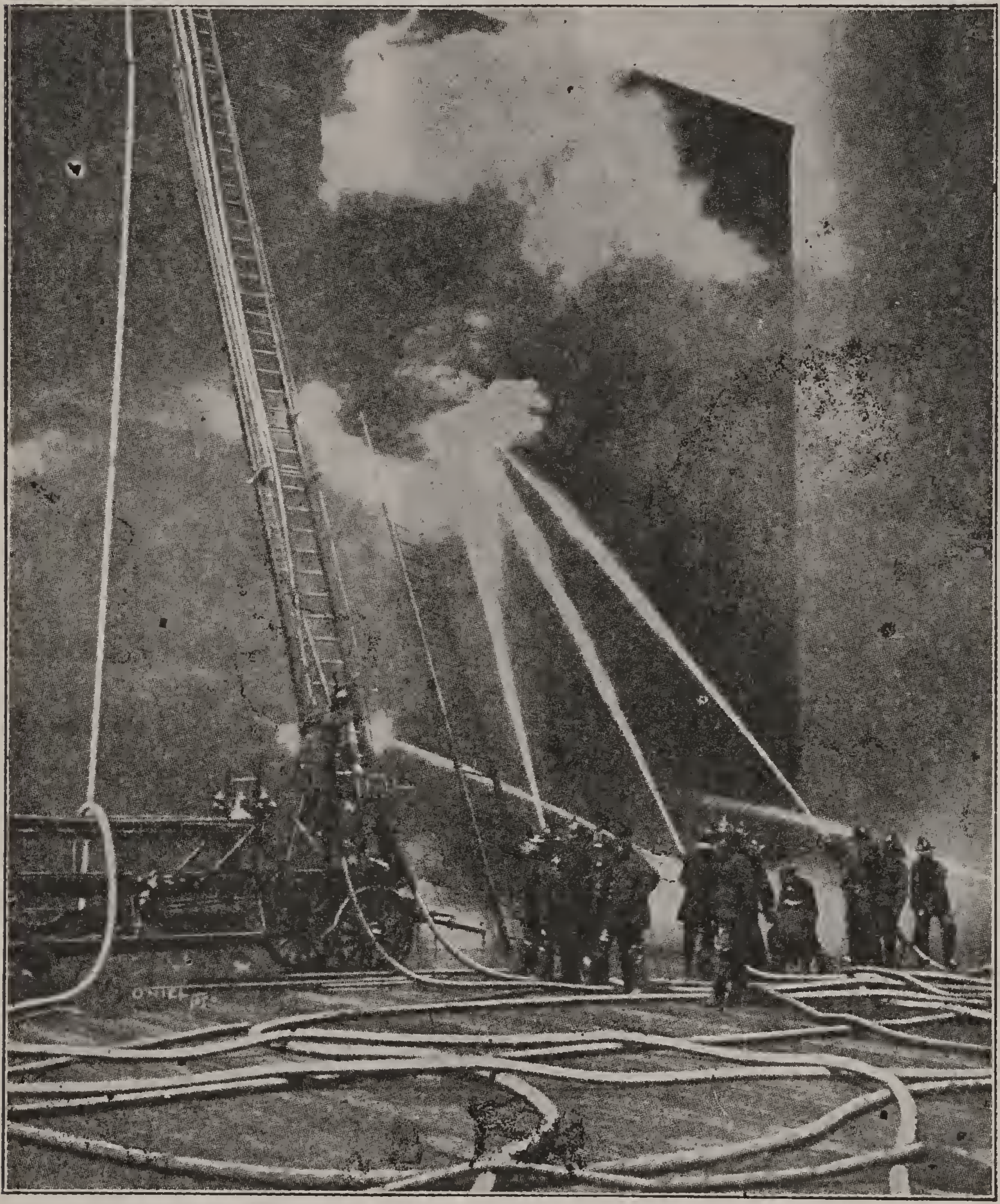
Last Stage of Drill.

The final step is taken when the men are thoroughly drilled in the manipulation of the life net. A tinge of realism is given this practice by precipitating bags of sand, weighing from 75 to 100 pounds, into the net from an elevation which would correspond to a three or four-story window. When the men have become sufficiently proficient, they are enrolled in the service and the serious work of the fireman begins.

The first three years the salary is $1,000 per year, and thereafter $1,400. The annual compensation of the officers is:

Chief	$5,000
Department Chief	4,300
Chief of Battalion	3,300
Captain	2,160
Lieutenant	1,800
Engineer	1,600

After twenty years of service, retirement on half pay may be allowed; and in case of death while on duty, $1,000 and a pension of $25 per month goes to the nearest kin. As a class the firemen are superior physically to the policemen. In addition to regular municipal departments many mills and factories are equipped with hose, ladders, hydrants at convenient intervals, and other modern apparatus. Their employés are organized into hose and ladder companies, engineers, etc. Such private organizations are suggested, encouraged and required by some insu ance companies and add to the securi of property. Some insurance concer supply a pamphlet of tactics for the i struction of private organizations.



MODERN FIREMEN FIGHTING A BLAZE IN A GRAIN ELEVATOR.

Note the huge streams of water.

There are two simple contrivance the product of mode ingenuity—simpl things are the mo difficult to create— which, if used promp ly, afford almost abs lute immunity fro danger, either to life to property.

The Fire Extinguisher.

The first is a fire e tinguisher. It consis of a small bottle of aci sealed with mica an containing a rubbe covered lead ball. Th bottle is within a larg one, holding, in add tion, four gallons water in which soda held in solution. Th whole apparatus is e closed in a metal cas and fitted with a hos At alarm it is inverte the ball breaks throug the mica, and the r leased acid, coming int contact with the sod and water, generate gas, which discharge a stream of fluid abou fifty feet.

At a test made in New York, one o these machines extinguished in 59 second a fire in a pile of pine boards and barre which had been saturated with kerosen and allowed to burn until some of th timber was charred. Such a device woul have prevented the New York Windsor Hotel fire, and the loss of forty-six lives. The second contrivance is a simple strip of canvas which is bound on the edges with rope and can be rolled up and fastened at the window-sill. When fire breaks out these rolls are cast out the window, the sympathetic crowd seizes the lower end, makes it fast across the street, and in the improvised chute the building's occupants slide to safety.

Until recently, many students of the fire problem have maintained that our modern sky-scrapers should be abbreviated and brought within range of the engine, which cannot force a stream higher than nine or ten stories, but a New York engineer maintains that the fault lies with present methods of fire-fighting, and not with the height of the buildings. If properly equipped, he says, the sky-scraper could be made a protection, not only to tself, but also to surrounding structures. A row of sky scrapers would have prevented the spread of the flames which devoured Chicago three decades ago. New York has finer natural facilities for an effective fire system than any city in he world. Surrounded on three sides by water—salt water at that—and all parts of the city easily accessible, an almost perfect system might be established.

"Control," the Watchword.

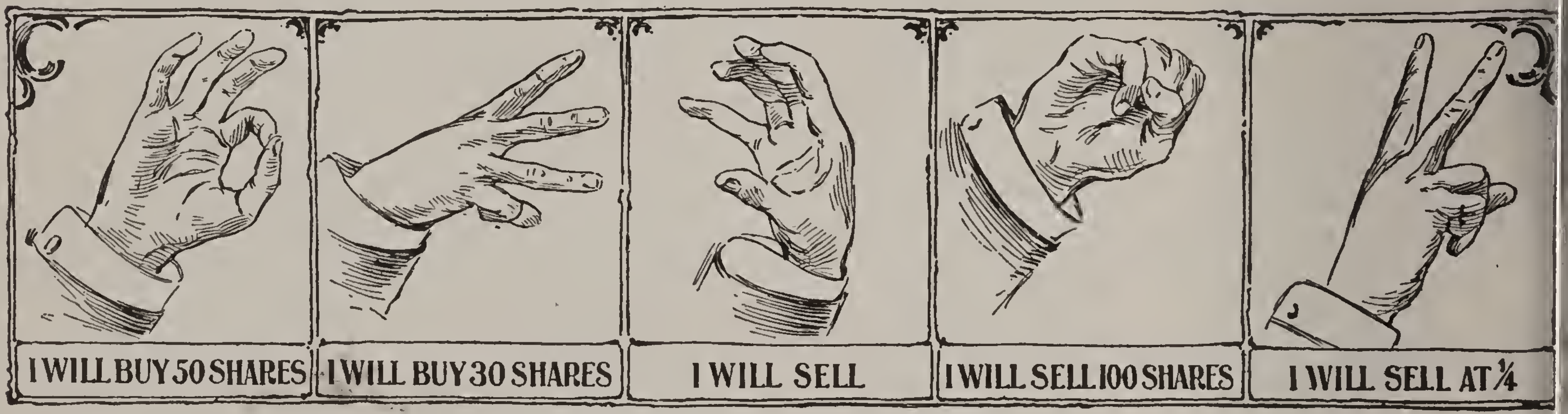
"Control" is the watchword of the fire fighters of to-day. To confine the flames to the point of origin rather than merely to extinguish them is recognized to be necessary. Direct attack of the origin of the fire would frequently be futile, and not only would it be impossible to extinguish the flames at that point, but attention there would allow them to spread.

The fire losses paid by insurance companies, each having over $1,000,000 assets during the year of 1898 amounted to $56,000,000. The largest and finest fire department in the world is owned by the city of Chicago. Since 1871 its equipment and maintenance has cost the city $50,000,000. The city maintains ninety steam fire engines, all of which can be used at one fire. Chief Swenie, of the Chicago department, is ranked as the "first fire fighter" in the world. He has been in the Chicago department fifty-one years.

SPECULATIVE HAND SIGNS.

How Brokers Buy and Sell Grain and Stocks—Expressive Use of the Fingers an Hands—Code of Honor that Governs all Traders.

MILLIONS of dollars change hands daily in Wall Street and the other great money markets of the world without the scratch of a pen. The trading is carried on with signs made by the hands and fingers. It is generally recognized that men must be scrupulously honest in these dealings, more honest, in fact, than in almost any other business. The reputations and the opportunity to be disgraced are so great that many rules are in use which would seem curious anywhere but on the floor of the exchange. Visitors to these exchanges during a busy session imagine that the brokers and every one on the floor are crazy, but through all that excitement the greatest order and system prevail.



THE SIGN LANGUAGE.

Used by members of a Board of Trade in buying and selling grain and shares of stock.

The noise at these sessions is so great that men are unable to hear one another talk even when speaking directly into the ear. Megaphones cannot be used, as thi would make matters worse. In order t make sales with a customer standing few feet away the broker has a code o signals or signs which he makes with hi fingers and hands like a deaf and dum person. In this way millions of dollar worth of stock are bought and sold dail throughout the world.

How it is Done.

The hand vocabulary enables a man t bid or make offers on a stock an announce the number of shares an an exact fractional price more quickl than he could speak. A single finger o either hand held horizontally signifies te shares of stock or 1,000 bushels of wheat Two fingers together mean twenty share or 2,000 bushels of wheat, and so on Fifty shares is signified by an "O," mad by the thumb and first finger. One hundred shares or 100,000 bushels of whea

DULUTH BOARD OF TRADE AND THE TRADERS IN THE WHEAT PIT.

e signified by a closed hand. When a roker wishes to buy wheat or stocks he ts his fellow brokers know by extending s hand partially open, and drawing it owly to him. When anxious to sell he ushes his open hand from him. The ames of stocks are not told by signs, but e brokers gather about blackboards ich bear the names of the stocks being d.

The rules of the exchange governing such transactions are very rigid, yet it surprising the large number of disputes sing every day. A committee of a half zen or more men are constantly patrol-g the floor to enforce the rules. A man th authority to decide disputes also sits on a seat overlooking the floor, but these precautions are rarely needed. A thousand disputes which it would seem must inevitably end in a free-for-all fight arise each day and quickly subside.

It sometimes happens that two men will misunderstand each other in quoting a price, and that after the sale is made each will have a different quotation in his mind. The disposition of these cases is curious. The disputants immediately go before the presiding officer and state the trouble. The friends of both parties immediately crowd around the judge. The officer in charge then calls for a vote of hands on the dispute, and the majority rules.

RUBBER MANUFACTURE.

Adhesive Nature and Process of Treatment—Manufactured Articles Made by Compression—How Rubber is Vulcanized.

IT has been but two centuries since rubber was known only as a curiosity; now it is used by all in everyday life, and has added greatly to the possibilities of the industrial arts.

The process by which crude rubber is treated to bring it to useable shape are simple and consist mostly of kneading by steam rollers. The first operation is the softening by throwing it into hot water tanks. Here it stays some hours and is then removed and cut into chunks and thrown into "washers," which are heavy machines with steel corrugated rollers.

This serves to crush and mangle the rubber as it passes through and also removes impurities by means of small streams of water playing down upon the washer. Sometimes the rubber contains a curious impurity in the shape of big brown rubber bugs, which are able to live in the recesses of the rubber without food and with little air.

Rubber is Adhesive.

So adhesive is the nature of rubber that in a little while the washer has transformed the chunks into a continuous sticky mass. These sheets are allowed to dry and then are crushed again between heavier rolls. Next the rubber is run through the mixers, which are hollow steel rolls fitted on the inside with steam and water pipes to heat or cool in the operation of mixing. Here the rubber rolls through and through and adheres to one of the rolls like a blanket. This is cut off from time to time by the operator, who cuts with one hand, making the incision diagonal from side to side and rolls it up in a big bundle with the other hand and throws it back again for another kneading. A great amount of power is needed for this mixing, owing to the sticky property of the raw rubber. After the proper amount of kneading a compound is thrown in with the rubber that colors it the proper tint and gives it the particular qualities it needs for its destined work.

After the compounding the rubber material is run through calenders, or four polished steel rolls one above the other, which gives it the required thickness. The calenders are also used for crushing the rubber into cotton duck for making rubber cloth, etc.

All manufactured rubber articles are ade by compression, not by melting, d pouring into molds, as some think. he great process of vulcanizing rubber, scovered by Charles Goodyear, may be scribed as a method to effect a chemical ange in the rubber whereby the sticky d elastic qualities are removed by the plication of heat (usually by steam) and iving durability and other wearing qualities. Hydraulic presses are used with team connections suitable for the several inds of rubber goods to be made, and ressure of about 2,000 pounds generally eing exerted under heat to vulcanize.

RUBBER TREE IN U. S. BARRACKS, KEY WEST, FLORIDA, OVER 100

Vulcanizing Rubber.

In vulcanizing rubber belts a stretcher used to remove the stretch in the belts when they are being vulcanized. This consists of a heavy set of clamps with two hydraulic rams at 2,000 pounds pressure per square inch. In the manufacture of rubber belting the cotton duck which has had rubber pressed into it through the calenders, is laid out on long tables and cut into strips of the width the belt is to be. The strips are laid one over the other to the required thickness, sheet of pure rubber wrapped several ply. The belt is then and finished by vulcanizing in press.

Rubber hose is first slipped in rubber tube form over an iron mandril. Then it is wrapped with duck stripping its desired thickness, and outside this is rolled a thin sheet of rubber. This is covered with strips and sent to the vulcanizer. The vulcanizer for this work consists of a wrought iron pipe which can be closed at the ends and admits of steam for heating to the proper temperature. Compressed air is blown between the pipe and hose to remove the latter when the process completed. Cotton covered rubber hos such as is used by firemen, is made b drawing the rubber tube with the wove hose and then the whole is blown full steam.

DARING SEAL HUNTERS.

The Seal Has Been a Mischief Maker—Outlaws of the Sea Who Defy Englan and America—Laws Against Pelagic Hunters—Hunting the Sleepers and Defying Death.

SEAL has been a word synonymous with trouble to the United States and Great Britain since 1886, and to the former for even a longer period. The seal has been an unconscious mischief maker. When the United States paid $7,200,000 to Russia for the territory of Alaska in 1867 it was with no conception of the trouble that land held for the future. The first act of the government was to place the new district under control of the treasury department, and to enact laws prohibiting the slaughter of mink, martin or fur seal.

The Pribilof Islands of St. Paul and St. George, the breeding place of the seal, were eagerly sought after as the happy hunting grounds of the sealers, and to the Alaska Commission Company this part of the new territory was leased for a consideration of $60,000 per annum and a royalty of $2 for every seal taken by the lessees. The company was limited to 100,000 seals per year. This was regarded as an equitable agreement, and doubtless the treasury officials thought themselves very clever to have arranged matters so comfortably, but here a ne and unknown element arose.

The Pacific slope began to attract th ambitious youth and others of the east and as the region west of the Rockie began to teem with new activity and life complications entered into the seal question. Pelagic sealing (sealing in the dee ocean) began, and soon the herds were s diminished that the Treasury officialdo was greatly alarmed. No drastic measure were employed, however, until 1886, whe the United States revenue cutter Corwi was dispatched to arrest all violators o the law.

Three British schooners were seized, their skins confiscated, the boats condemned and the owners fined. Immediately arose a great uproar from Great Britain. It was demanded that the queen's subjects be instantly released. By order of the President this was done. But the Treasury department sent the cutter Rush in the following year, and a similar procedure followed.

The Bill of 1889.

The advent of 1889 brought with it a

bill for the better protection of the seal, and it was proposed to arbitrate the differences between the British and their American cousins. The bill passed Congress and the arbitration scheme was practically adopted. By this time, however, the season of 1891 was approaching. It was impossible to complete arrangements for arbitration and yet it was imperative that measures be taken to suppress the pelagic poachers before they resumed operations. Accordingly a modus vivendi was negotiated in which both Great Britain and the United States agreed to seize all violators of the existing law.

A SPERM WHALE.

Stranded by the tide and unable to float itself, subsequently killed and cut up for its oil and bone.

The High Joint Commission was appointed and met in Paris, February 23, 1893. It consisted of two arbiters from the United States, two from Canada, one from France, one each from Italy and Norway and Sweden. The case of the United States, presented by its counsel, filled six large printed volumes, and that of Great Britain filled eight equally large volumes. After the necessarily long deliberations of the tribunal, it handed down decisions which were rather favorable—all things considered—to the United States. Furthermore, it formulated a code of regulations which were to continue in force until either of the parties violated their terms. These regulations prohibited the killing (except by Indians) of seal within sixty miles of the Pribilof Islands at any time, and nowhere in the North Pacific from May 1st to July 31st. This close season of three months gives the seals an opportunity for safe passage to the Pribilof Islands from their winter quarters across the ocean. Besides this, the use of fire arms (except shot guns), nets or explosives were forbidden.

Other Provisions.

Pelagic sealing could be prosecuted outside the sixty-mile limit from August 1 to May 1. These regulations still govern sealing operations. Such rules, even, have not succeeded in protecting the herds. Nothing but a law which will absolutely prohibit pelagic sealing for a period of years, and thus allow the herds to restore themselves, will prevent their utter extinction. The Anglo-American Joint Commission, which considers all differences between the United States and Canada, weighed this question in 1897, but although the United States strongly urged the adoption of such a law, the Canadians absolutely refused to consent.

In the same year Congress passed a bill prohibiting sealing except by the North American Commercial Company on the Pribilof Islands, and demanded papers bearing a complete record of every skin applying for entrance at our ports. This was a blow to the Canadian interests, and was designed to force them to agree to the temporary suppression of pelagic sealing.

The pelagic or sea hunters carry on their operations from schooners which, during the stormy season, sail from our shores direct to Yokohama. This circumnavigates the disturbances and thence they bear toward the sealing grounds. The schooner sails swiftly along and suddenly the shrill cry, "Sleepers" comes from the watch. The boat is lowered and provided with compass, water and provisions for five days, a shot gun and a hundred shells,—then the hunters start.

Fifty yards away the seal is plainly discernible. He is asleep on his back with his flippers across his belly. The oars are taken in and stealthily the steersman shoves the boat toward the quarry. All hands are silent as the tomb, for although his eyesight is poor, the seal has a keen scent and acute hearing. He is approached from the leeward. Silently the boat diminishes the distance until, at fifteen yards, the gun flashes and the prize is won.

The boats are often out several days together, and in rough weather it is no mean achievement to land the seal with both boat and quarry tossing violently. At the Pribilof Islands the government has built fences to confine the bulls during the breeding season, and, where the ground is flat and smooth, boulders and rocks have been provided to protect the pups while the bulls engage in their perennial battles. The catch for the past few years has been:

Land Catch.		Pelagic Catch.	
1896	28,964	1894	61,838
1897	20,890	1895	56,291
1898	18,032	1896	43,917
1899	18,050	1897	24,322
		1898	21,200
		1899	19,512

ELECTRIC STREET RAILWAYS.

Popularity of Electricity as a Power—Guards Against Accidents—Franchises, Duration and Compensation—Detroit's Great Fight.

ELECTRICITY as a means of propulsion for street railways has grown in such favor that cars so operated in the United States are now in the majority. Of the 1,121 street railways in operation in 1899, 966 were electric and the remaining 155 as follows: horse, 103; steam, 31; cable, 21. It is expected that cable roads will disappear entirely, likewise all but the short and unimportant horse lines.

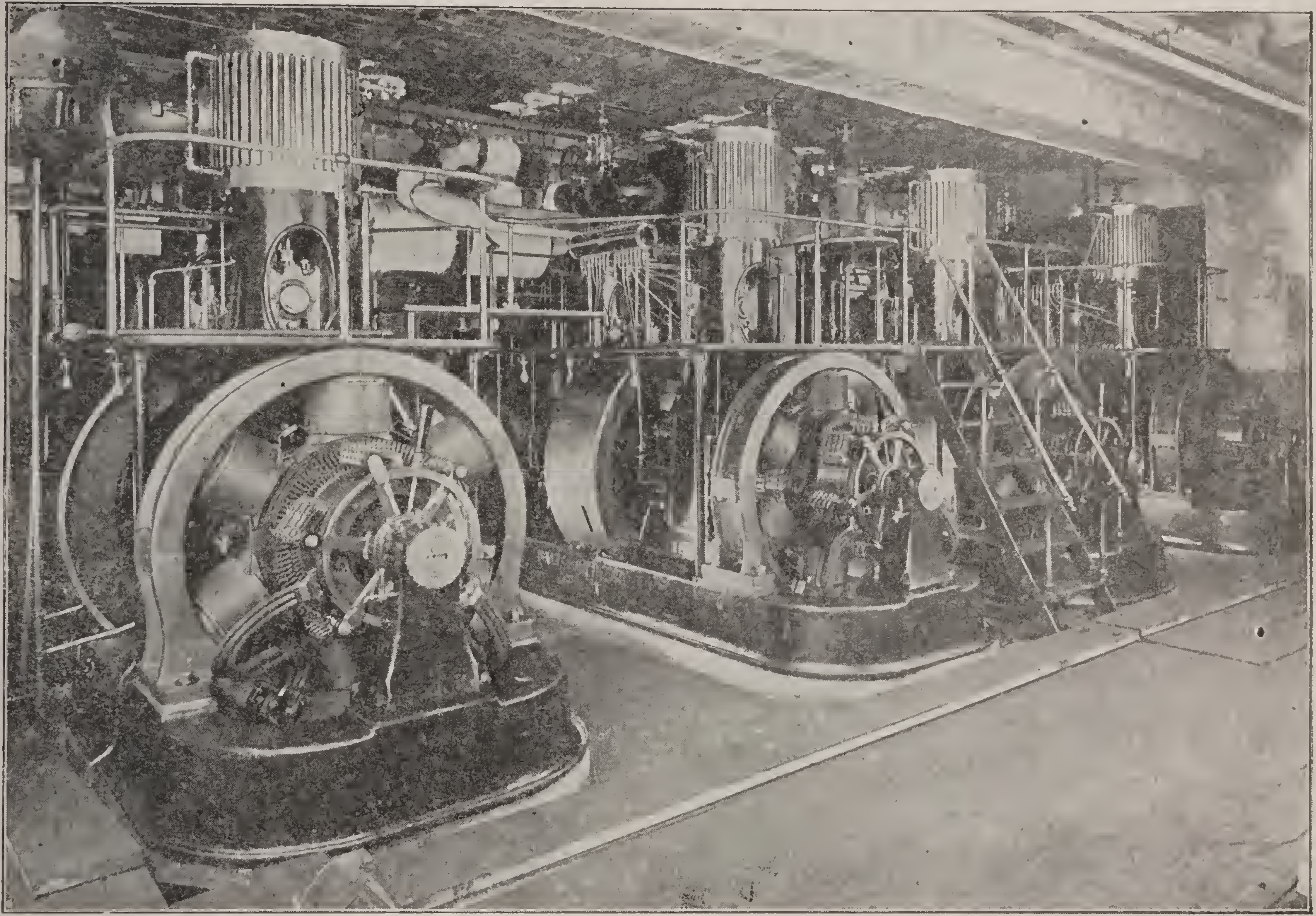
About one-fourth of all the horse-car lines in the country are in New York state and these lines represent about one-third of the mileage and a great majority of the horses in use. The greater number of these horse lines are in the suburbs of New York City, and it is expected that these will give way to electricity.

In place of steam many of the elevated roads use the third-rail electric system. The street railways of the United States are capitalized at about $1,600,000,000. In nearly all the country outside Washington and New York cities, the overhead electric trolley system has gained a strong foothold. In New York the open slot underground system has pushed rapidly to the front, and in Washington nearly all the lines are so equipped. In Europe the overhead trolley system continues to be the one generally employed.

Roadbeds are Improving.

Many improvements have been made in the line of road-bed construction in the last few years. Permanence and stability have been insured by cast-welded joints and electrical welds. Some roads have tried concrete beams and blocks for the wooden ties. An attempt to bond rail joints has been made with a view to returning waste current to the power houses by the rails instead of by gas and water mains, and thus save the latter pipes from being destroyed by electrolysis or disintegration by electric current.

In 1898, in Lowell, Mass., an automatic block system for single-track electric roads was installed to aid cars in passing from an opposite direction without collision. The line was divided into blocks, each of which was connected with an automatic cut-off, so that when a car entered that block the current was cut off until it left that block. Then the current was turned on again automatically. Thus two cars could not come into the same block from opposite directions and collide.



POWER HOUSE OF AN ELECTRIC STREET RAILWAY.
Showing the powerful dynamos used to generate the electric current.

There have been many accidents on electrically operated lines. One of the worst, in 1899, was in Bridgeport, Conn., on August 6, when twenty-nine persons were killed and many more seriously injured by the fall of a car from a high trestle. The car jumped the track as it was going upon the bridge and bumped along the ties for eighty feet, then leaving the bridge, turned upside down and crashed to the bottom. The heavy motors on the bottom of the car broke through the floor and crushed the passengers beneath. Many of the cars are equipped with power brakes operated by electricity and air, decreasing the liability of accident.

Largest Power Plant.

The largest power plant for a railway in the world is that for the Third Avenue Railroad Company, at 216th Street and 9th Avenue, New York City. It is equipped with sixteen engines of the vertical, cross-compound condensing pattern, having generators mounted on the shafting between the cylinders. Each engine has a normal horse power of 4,500, making a total of 72,000 horse power on the average, which can be developed on an emergency to 100,000 horse power. Sixty boilers of 200 pounds pressure each are stoked by machinery from boats to the furnaces, and are emptied of ashes in a similar manner. The chimneys are 200 feet above the floor of the boiler-room and consist of four stacks, which are made of brick for the first 102 feet and of riveted steel courses for 98 feet. The steel part is self-supporting, 12⅔ feet in diameter and lined with brick. The ordinary chimney draught is supplemented by eight exhaust fans. There are sixteen generators of electricity in the plant, one for each engine, and the current is led into the railway lines from five or more transformer sub-stations.

Detroit's Fight for Ownership.

In 1899 a struggle for municipal control of the street railways of Detroit attracted considerable attention. The movement was defeated by a court decision to the effect that the state constitution prohibited the use of State funds for internal improvements in Michigan, and that it was illegal for a city to construct street railways, since the legislature could not authorize a city to do what the state itself was not allowed to do.

The franchise question—the right to use the public streets for a certain period of time is agitating the cities and street railway companies of the United States. The question of compensation to the public is involved with the franchise question.

The following is a comparative table of length of street-railroad and other franchises in Chicago and the principal American cities:

	Years.
Elevated railroads in Chicago	50
Steam railroads in Chicago	perpetual
Gas companies	perpetual
Telegraph companies in Chicago	perpetual
Street railroads in New York	999
Street railroads in Boston	perpetual
Street railroads in Philadelphia	999
Street railroads in Washington	99
Street railroads in St. Louis	45 and 50
Street railroads in San Francisco	99
Street railroads in Kansas City	50
Tribune's school lease	99
Record's school lease	99
Trust newspapers' tubes in downtown streets (Medill & Co.)	50
Asked by street railways in Chicago	50

Rates of Compensation.

Comparative table of the highest rates of compensation paid to the municipalities by the street railroad companies in various cities of the United States:

	Per cent gross receipts.
New York	3
Boston	4.5
Philadelphia	nothing
St. Louis	2
Washington	4
San Francisco	5.15
Kansas City	2.5
Chicago (at present)	10

An approximate idea of what it costs to build an electric street railway is given in the following figures on the Detroit system prepared by Prof. Edward W. Bemis:

175.95 miles of track	$4,350,183
Overhead trolley	760,939
One power house	440,894
One power house	366,249
One repair shop	8,003
Tools and supplies	75,990
Rolling stock	1,102,212
Car houses and land	523,248
All other buildings	179.016
Total (cents omitted)	$7,806,737

THE MODERN DRAMA.

How a Play is Staged—Actors and Actresses Preparing for Rehearsal—Difficult Learning of Parts—The Stage Director's Duties—How the Stage Carpenter Works—Real Cannon Brought Into Service—Powder and Wigs.

LITTLE is thought by the average theater goer of what transpires between the conception of the piece by the playwright, and its first presentation on the stage. Rehearsals, scenic workmanship, the manufacture of wigs, costumes and properties are scarcely thought of as the attention is absorbed in the interest of the play. It is, therefore, interesting to observe what are the preliminaries to the final production of the piece.

The first step is the reading of the play. Those who are to take part are assembled in some suitable room, and the piece is read aloud. The author is invited, by courtesy, to do this, but he usually excuses himself and the dramatic director delivers it. Thus the actors and actresses get the general setting, their relation to the others, the plot, etc. Each actor receives a typewritten copy of his or her part with the "cues," but not a copy of the entire play; the "cues" are the last few lines of the speech by the preceding actor. It is important to memorize these fragments as carefully as the part itself, for mistakes at these points would result in disastrous confusion.

The first rehearsals are gone through in ordinary clothes. The position of balconies, doorways, winding paths, bridges or floral bowers are indicated by chairs and other makeshifts. To begin, the parts are not committed to memory at once. The action of the first act is learned and the location of the actors on the stage thoroughly understood. The actors read their lines with no attempt at expression. The same afternoon the second act is gone through in the same way.

Learning Their Parts.

When these preliminaries are completed the director announces:

"Ten o'clock to-morrow morning—first act rough perfect without parts."

This means that the performers will be expected to be able to repeat their lines without manuscript on the morrow. All are not able to do this, and on the third day, if still imperfect, are severely reprimanded. By the end of the first week most of the actors have learned all that the author has set down for them to do—

action and language. The director then calls for rehearsal "letter perfect," which means that every one must be able to recite his part with absolute correctness —to the smallest word. Of course, this is frequently not accomplished, and that necessitates a "rehearsal for lines," when the performers sit in chairs and repeat simply the words of their parts with no attempt at action.

By the conclusion of the second week everything is committed thoroughly to memory. Actors never receive wages while rehearsing. The stage director is the autocrat of the theater, and his word is the law to which the players must submit. Were this not so, the actors, each striving for individual achievement rather than for the general effect, would radically upset the balance of the piece and the composure of the author. Especial pains are taken in the rehearsal of love scenes and such situations where the action plays such an important part in depicting the sway of the emotions. Here again the director is dictator; if the lover is not ardent enough, he, himself, places the hand where it should be. Most of the kisses given on the stage nowadays are real, but this is not rehearsed excepting once or twice, to be sure the effect will be just right.

The Stage Director.

The stage director is usually a gentleman, though some are boors, and deals with ladies and gentlemen. He is frequently a dramatic scholar and must possess a fine quality of dramatic instinct. He must know aside from precedent and rule whether that action is "the thing." When action and lines are "letter perfect" the "rehearsal with props" is the next step; that is the dress rehearsal with scenery, properties, etc., in proper position, just as it is to be the opening night. The director, the author and the manager constitute the audience and criticise an make changes. If there are any cho ruses, ballets or musical numbers thes have been rehearsed, perfected, separ ately, and are now brought in in prope order. This is true also of the "of effects," which are the yelling of crowds the raging of storms and other noises fro behind the scenes.

TWO SOUBRETTES READY TO GO ON FOR THEIR ACT.

Meanwhile the scenic artist is at work. He proceeds according to written instructions of the author and makes a water-color sketch of each scene. If actual places are to be reproduced he photographs them or obtains pictures. Historic scenes are dug out of books and reproduced. He then makes water-color drawings on cardboard of each scene, carefully depicting everything. The parts are cut out and mounted on a miniature stage from two to four feet long. Everything is adjusted by a scale just as architects' working drawings are. This miniature stage is then illuminated, corrections made, if necessary, and then, when accepted, is turned over to the stage carpenter, who constructs everything according to the scale.

A MAKEUP IN BLACK AND WHITE FOR A HOTTENTOT MINSTREL SHOW.

Usually scenic artists are specialists and paint exclusively interiors, landscapes, or architectural scenes. They do little of the actual work beyond designing, but entrust all but the most difficult to subordinates, who reproduce their original design. The immense canvases are usually hung against the wall of the back of a stage in some theater and a working balcony erected before it. Such things as cannot be reproduced and enlarged by canvas and frames, as small rocks, fallen trees, broken cannon, etc., are done in papier mache by the property man, who also constructs everything that is not purchasable ready-made. A scene brings from $100 to $1,000, according to the nature and quality of the work.

The Stage Carpenter.

It is the business of the stage carpenter to build frames for the scenery, bridges, balconies, etc.; and opportunities for inventive genius abound here, for, in devising reversible scenes, in hinging pieces for convenient packing, and in many other ways, the stage carpenter may demonstrate his value. A clever craftsman makes $50 a week.

The matter of costumes is an important one. To a limited extent actresses are permitted to exercise their own taste in selecting their gowns, but everything must be approved by the director, for an actress, if given latitude, might choose a color that would clash with the other costumes and the scenery. It has become the practice among managers to patronize the department stores for costumes rather than costuming concerns. The actress secures samples, has them approved, and then takes them to stylish tailors. She is allowed a fair but fixed amount for her gowns, but may add what she chooses at her own expense. Realism and naturalness are the keynotes of the stage to-day, and many of the ball-room gowns seen behind the footlights are made by the same tailors who cater to the wealthiest society women.

When costumes are to represent some previous age, historical accuracy is required and water-color sketches are made as working patterns. Old clothes are hardest to secure. To make a new costume and tear it does not contribute the appearance of age, so rubbing and stains are resorted to. Male actors who are to represent tramps do not hesitate to purchase direct from "Weary Willies," and after fumigation and some washing such costumes are wearable.

Guns From Battle.

The military uniforms, guns and other appurtenances of war used for scenic effects are quite often the witnesses of real battles, and are obtained from professional costumers, who keep on hand the apparel of various ages and countries, which have found their way into their possession after serving their purpose in plays long since abandoned. The wig maker, too, is a specialist, and his skill is usually expensive. An ordinary ready-made wig will bring $15, while a special varies from $25 to $100. Actors frequently allow their beards and hair t grow long when their parts require it and actresses not uncommonly bleach an dye their tresses, especially if the piece i to have a long run.

Thus it is clear what a mass of detai contributes to the finished theatrical pro duction. There is no inflection of voice no gesture, no blow, no embrace; there is no scenic view, no costume, no wig, n property of any sort that is not carefully rehearsed and constructed beforehand, and once approved by the director it is never executed in any other way. It is the practice in New York, when bringing out a play, to have the opening night not

A POSE FOR THE PLAY AND THE ORIENTAL DANCE—A SCENE FROM CARMEN.

in the metropolis, but in some small adjoining town.

The author by this means has an opportunity, before risking a performance before a metropolitan audience, of estimating the effect upon the auditors, and of making alterations and improvements which may be necessary.

RAILWAY BUILDING IN THE KLONDIKE.

How the Franchise was Purchased and by Whom—Obstacles to be Overcome—Opposition of Property Owners.

IN Alaska there is an enterprising little railroad which is pushing itself to the front rapidly, and bids fair to be a factor in the development of those regions. t is the White Pass & Yukon Railroad, nd has been in existence for about two ears. Although the greater part of the ne exists merely on paper, the contractrs are rapidly pushing the work, and ithin a few years a line from Skagway Fort Selkirk will have been completed.

At present the road extends from Skagay to White Horse Rapids. Considering s size the road compares favorably with ny other road in the world. All the iners' supplies, food, etc., are transported on this line. The road heads for Dawson and miners bound to that city are given a little help by the road as it now is. From White Horse Rapids to Ft. Selkirk the line has been surveyed, but the work of construction has been greatly impeded by the weather and topography of the country. There is a remarkable tale connected with the road.

CE FLOES AND DRIFT ICE OFF OF THE ALASKAN COAST AND IN THE VICINITY OF THE FAMOUS MUIR GLACIER, AND THE WHITE PASS RAILROAD.

Purchased by Chance.

Strange though it may seem, it is a fact that the builders of the road purchased the franchise by chance when they knew absolutely nothing of the country beyond its reputation for coldness. The London firm was that of Close Brothers. Some enterprising gentleman had acquired a right to construct a railroad in Alaska, but being unable to raise the necessary funds, he sold this right to a London company, which borrowed the money on condition that the loaners be permitted to assume the construction of the road in case the company was unable to see its way through. Close Brothers made the loan, and according to the agreement came into possession of the railroad.

This firm in turn dispatched their American representative, a civil engineer, to Alaska with instructions to build the road. He set about the task, and afte many vicissitudes saw the first two mile of road constructed through the mai street of Skagway. Much opposition wa offered to the erection of the road eve by those most benefited by it. Property owners advanced their prices for rea estate in hopes of forcing the railroa company to buy. Traders and storekeepers handicapped the company in ever way conceivable. But the road was bui and is pushing its way through the froze passes of the Northwest. It will cost whe completed about $6,000,000.

Postal Service of the United States.

Employes, Expenses and Revenues of the Department—Time Saving Devices—Value of Fast Mail Trains.

SOME idea of the enormous work undertaken and carried out by the Post Office Department may be had when it is considered that it directs the operations of 73,570 post offices and has on its pay rolls 200,000 employés. In 1899 the expenses of the department were $105,000,000 and the receipts almost as much,—for it must be said that, despite the efficiency of the department, the government is so liberal in the matter of second class postage that the department is not entirely self-sustaining. In 1898 the various offices handled 6,214,447,000 pieces of mail matter, of which 2,825,767,000 were letters. Thus the government delivers for its citizens every minute of the day some 12,000 messages.

There is a vast difference between th smoothly-working system of to-day, wit its lightning mail trains, its free city an rural delivery and its gigantic mone order department, and that of the ol private pony post of the time of ou grandfathers. During the term of offic of Timothy Pickering, first postmaster general under Washington, the receipt and expenditures of the department for quarter of a year showed an aggregate o only $63,000, which is now spent by th department every six hours of the day To-day the manufacture and delivery o postage stamps is a gigantic enterprise i itself. In 1898 alone there were mad and distributed to the various office postage stamps to the number of 3,623,821,608, valued at $71,788,333, and poun postage was paid for the carriage o 2,069,742,000 newspapers.

Four great branches, each under the immediate charge of an assistant postmaster-general, conduct the operations of this enormous government business.

CHARLES EMORY SMITH.
Postmaster General.

They are: First, the department for administration of the post offices, the carriers and clerical force, and the actual management of the general work of the offices. The annual expenditure of this branch of the service is over $40,000,000. Second, the department for the transportation of mails,—which sees to the contracts for the railway service, etc., and which operates at a cost of $35,000,000. Third, the department that conducts the financial side of the service, furnishes stamps and keeps accounts; and, Fourth, the branch that appoints over 70,000 postmasters and directs the force of inspectors. Besides these departments there is the auditor's office employing 500 clerks and which is a bureau of the Treasury. Through it all post-office accounts pass for scrutiny and audit.

New York Postal Revenue.

Revenue from the numerous offices throughout the country varies greatly, that of the New York post office being more than $8,000,000 annually with a net profit to the government of about $5,000,000, while many of the little cross roads offices do not sell $25 worth of stamps a year. The salaries of the postmasters vary; those appointed by the President are about 3,800 in number and command not less than $1,000 yearly. The fourth-class offices in which the salary is less than $1,000, are over 70,000 in number and appointments are made by the postmaster-general.

Some of the branches of our service command especial respect, and excel in efficiency similar bureaus in foreign countries. One of those which is greeted with popular approval is the free delivery system which employs 140,000 carriers at an annual expense of $14,000,000 and which brings mail to the door of every resident of the larger cities without the least inconvenience. The marine service on the Great Lakes is marvelous in its magnitude and smoothness of operation. Eight months of the year at the mouth of the Detroit River vessels pass every three and one-half minutes of the day and night. Here every steamer must be met and the mail collected and delivered without slowing up. The great fleet has a postal system which is carried out effectively and which enables every seaman absent from home to receive or send mail without delay. Letters are stamped on the back with the name of the steamer to which they are to go. Water-tight bags are used in case the boats making collections are upset, and so thorough is the system that every boat is met and served as easily as though they were only so many post boxes on land.

Thousands are Employed.

Started in 1864 the railway post office now employs 8,100 men, and had in service in 1898 cars that covered a total of 281,585,612 miles on 174,000 miles of railroad track. In 1884 there were distributed in railway post offices 4,519,661,900 pieces of mail; in 1890, 7,865,434,101, and in 1898, 12,225,706,220, so it may be seen that the increase in that branch of the service is tremendous. To-day, mails are handled, sorted, pouched and delivered to every point desired without the least delay at the distributing point. Clerks on the line must know every office in the territory and no flaw in memory or inaccurate throw to a wrong pouch is excusable. When applicants wish to enter the railway service extremely difficult examinations must be passed. The entire scheme of the territory must be memorized. Before this examination was compulsory one error occurred in every 720 letters. In 1884, however, this had been reduced to one in every 4,152. Through changes in the administration in 1888 the efficiency dropped to one error in every 3,694 pieces of mail, and in 1890

A TELEPHONE CONVERSATION.
Showing manner of holding receiver, and answering.

even to one in 2 834. Extra diligence on the part of the inspectors has brought back the record, however, to the almost perfect mark of only one error in 10,428 pieces sorted and delivered.

UNITED STATES POSTAL CLERKS.
At work on a fast mail train between Chicago and New York. Pouching the mail.

Time saved is the object of the railway service and in order to effect this saving fast mails had to be originated. Now a fast mail train crosses the continent four hours ahead of any passenger trains. Between Chicago and Omaha the lightning rate of from 80 to 90 miles an hour is often reached. To secure this rapid travel small stations must necessarily be skipped. The mail, however, is always picked up and delivered, while the trains rush past, by the "catcher-pouch" system. This consists simply of a post to which is hung the mail bag to be taken on board the flyer, loosely secured with twine or on a hook. A sort of crooked arm is attached to the doorway of the car, which, upon being operated by a lever, reaches out and grabs in the pouch. At the same time any mail to be delivered to the station is thrown off by hand, or, with some systems, pushed by the arm and attached to the post while the other is being collected. This service is rather dangerous, in 1889, sixty-nine clerks were killed and 1,324 injured while on duty.

Mail Service on Cars.

To save time in the final delivery of the mail intended for the larger cities a city distribution service is maintained on board the fast mail trains, and so effectual is it that the mail may be taken in the bags direct to the sub-stations in the city without a moment's delay. This system of course necessitates employing men who thoroughly understand the lay of the city.

Bags for the service are supplied by contract and are nearly all fed into service through the New York office. The great trend of mail is from the east to the west and from the large commercial centers to the country. There are certain offices in every district where bags naturally accumulate and whence it is easy to send them once more into the service. Cincinnati and St. Louis are made distributing points and either city is ready to supply from 5,000 to 20,000 bags at one shipment. Each year over a million and a quarter are repaired and fed through the offices at Washington, Baltimore, New York, Chicago, Boston and Philadelphia. The great outflow of bags is around the Christmas holidays, returning the latter part of January, only to pour out from the commercial centers once more in the advertising season in May. Bags of all sorts are in use and new ones are constantly demanded. There must be the bag for the mountain carrier and for the runner on snow-shoes, knapsacks and bags for the Alaska dog teams and saddle bags for the pony express. The latest application for a special equipment called for a perforated bag for mailing queen bees from the Pacific coast to the islands of the Pacific. Heretofore ordinary sealed sacks have been sufficient for mailing these live packages, but the trip across the ocean is so long that the bees are likely to be suffocated.

A word about the celebrated " star" routes is necessary. Considerable scandal prevailed over contracts let for these routes in the early days. The way they obtained their name was by the act of Congress which specified the mail was to be carried over routes which could guarantee "celerity, certainty and security." The mark XXX was used to designate these routes, and when the bribery and fraud arose the natural reference was made to the "star" routes. These lines consist mainly of coach routes, etc., and altogether there are in operation some 2,200 of them. There are four seasons, one each year, for making bids for these contracts and the forty-one bids for each route in 1898 aggregated 218,000. Bidders are mainly speculative, and it is an old fact that the local carrier will eventually do the work for the successful bidder more cheaply than he does it at first hand for the government. The longest star route is from Juneau, Alaska, via Circle City in the same territory, along the Yukon River, to Tanana, a distance of 1,618 miles. The next longest is from Tanana to St. Michaels, 900 miles.

Big Money Orders.

The money-order division of the post-office department is one of the greatest clearing houses in the world. In 1898 money orders to the number of 29,000,000 were issued for amounts totaling $205,000,000. Three hundred and fifty clerks are employed in this division who do nothing all day long but add up long columns of figures. Our money order department, however, is far behind many European offices. Germany issued in 1898 100,000,000, amounting to $1,800,000,000; Great Britain, $310,000,000. But it may be explained that the post office money order system has been established longer in those countries.

Letters that are misdirected, unaddressed or unclaimed, and which have to go to the dead letter office for identification number 20,000 every year. In 1898 nearly $1,000,000 was thus sent back to its rightful owners. The same year over 50,000 parcels with no addresses at all, and many of them containing snakes, dynamite and curious freaks were disposed of by the office.

Until 1874 there were no uniform rates for foreign mails. What rates there were were regulated mainly by treaties with the separate countries. To-day, however, five cents will carry a letter around the globe to find the person to whom it is addressed. There are no general contracts with steamers, but rather fixed rates. On three liners there are sea post-offices the same as on our fast mails, and mails thus transported may be given directly to the carriers in the local districts for delivery without going through the land offices. In the harbor of New York the transfer boat "Postmaster General" meets all steamers and carries the tons of mails between them and the trains.

Postal Delivery Post.

One feature being developed by the mail service is that of carrying parcels.

At present in the Western Hemisphere sixteen countries and colonies can be reached by service that will carry packages weighing up to eleven pounds. This branch is growing also in Europe, and threatens to undo the express companies. The postal delivery is a great convenience to the public.

BORES IN THE EARTH.

Europe Leads in Great Tunnels—France and Italy Have Many in the Alps—The Great St. Gothard's Bore—One Sought for the English Channel—Method of Driving Through a Mountain Wall—Tunnels in the United States.

THE United States, though it passes the world in many respects, does not lead as a country of tunnels. The only American tunnel more than a mile and a quarter long is the Hoosac, which has a length of four and three-quarter miles, and in which the builders broke no records except those for slowness and expense. It cost $15,000,000, and took twenty-one years to build.

The regions in which tunnels reach the greatest size are those of the Alps, where the people point with pride to the Arlberg tunnel, six and a half miles long; the Mount Cenis tunnel, seven and a quarter miles; the St. Gothard, nine and a quarter miles long, and the Simplon, which will be twelve and a quarter miles in length when its builders get through the mountain.

It was about 1855 when the people of France and Italy became tired of walking over the Alps, and packing by mules, and they resolved to have a tunnel. They began work in 1857 and proceeded to cut their way into the heart of the everlasting hills with pickaxes and crowbars. Working both in France and Italy, they could bore only eight feet a day, and in some places only two feet a day. After digging at the living rock for five years it occurred to a Frenchman named Sommeiller that time could be saved by the use of machinery. He invented a drill that could bore a hole in twenty minutes that two workmen could not dig in two hours. After that the tunnel in the Alps progressed more rapidly, and toward the finish the progress was fourteen feet a day. The tunnel was finished in 1871.

The Famous St. Gothard's.

Tunnel communication was hardly established between France and Italy when work on the St. Gothard railway was begun. This resulted in connecting Italy and Switzerland through the most stupendous system of tunnels in existence. This road, though quite short, cost more than $52,000,000. It passes through one of the most mountainous countries in the world, crossing fourteen viaducts, 115 bridges and traversing seventy-nine tunnels, having a total length of nearly thirty-one miles.

Running southward from Lucerne the St. Gothard railroad follows the valley of the Reuss River, rising gradually as it passes the jagged Spannorter and the strangely contorted glacier of Schlossberg. Every mile of progress means an ascent. The route lies past the Bristenstock, the Oberalphstoch and the Grosse Windgall, — mountains over 10,000 feet high. At last, when the grade becomes so steep that no train can climb it, the locomotive dives into the interior of the mountain and begins climbing upwards after the fashion of a corkscrew. Inside the Pfaffnesprung loop tunnel the train mounts 155 feet, coming out on a terrace where the ascent is less difficult, and then plunging into the Wattinger loop tunnel, in which it ascends seventy-five feet. The route then turns upon itself and the train countermarches in a long loop to the Liggestine loop tunnel, in which an ascent of eighty-two feet is made.

Presently the great tunnel of St. Gothard is reached and the train clangs through nine and a quarter miles of solid rock. It then begins its descent, corkscrewing its way down through the insides of four mountains, at last reaching the plains, more than 3,000 feet below.

A solid mile of earth presses down on the tunnel of St. Gothard, and above it 6,000 feet towers the Kastelhorn. The tunnel passes under the Lake of Sella, and between the lake's bottom and the roof of the tunnel is two-thirds of a mile of earth and rocks. A thousand feet above the tunnel there is a village called Audermatt, standing by itself on a little lonely plain. The pressure of the earth at this point on the tunnel was so great that it crushed the tunnel twice, and now it is only held intact by huge arches of masonry, fifteen feet thick at the sides, and ten feet at the roof. It took nine and a quarter years to build the St. Gothard tunnel,—a year for each mile,—and its cost was $11,350,000. With all the improved drills, compressed air, etc., the workmen averaged only fourteen and a half feet of progress a day.

ST. GOTHARD'S FAMOUS TUNNEL ENTRANCE, PIERCING THE ALPS. IT IS 9¼ MILES LONG.

Great Bores of the Alps.

The third great transmontaine tunnel is the Arlberg. It is six and a half miles long,—almost as long as the Mt. Cenis,—and yet it took less than one-fourth as long to build it. Begun in 1880, it was finished in 1884, having progressed at a rate of twenty-seven and three-quarters feet a day. It connects the province of Von Arlberg with the rest of the Austrian Tyrol through the Arl mountains and facilitates trade between Austria-Hungary and France.

One of the earliest European tunnels built successfully was that by Prince Torlonia, between 1854 and 1876, at a cost of $4,800,000, and was over the route used in the old Roman days by Emperor Claudius. That ruler is said to have employed 30,000 laborers upon it for eleven years, the purpose being to drain Lake Fucino which at that time covered 48,000 acres of arable land. Soon after the Roman tunnel was completed it fell into ruins and remained useless until restored by Prince Torlonia. It is now three and a half miles long and is in places 400 feet below the surface of the earth.

The first tunnel built in the United States was constructed between 1818 and 1821 and was on the Union Canal. It was 450 feet long, twenty feet high and eighty feet wide and has long since been made into an open cut. A noted subaqueous tunnel in America is that built by the Grand Trunk Railway under the St. Clair River. It took twenty months to make this bore of 6,050 feet and the cost was $3,000,000.

Wolseley Opposed a Tunnel.

The boldest tunnel ever projected was that under the Straits of Dover, which would have been twenty-one miles long. Lord Wolseley declared that it would facilitate the invasion of England from France, therefore it was abandoned. Two of the most recent tunnels are under the Thames River at Blackwall for carriages, and under the Spree River in Germany for street cars. The Croton aqueduct which carries water to the city of New York is thirty-three miles long and is one of the greatest engineering feats in the world. The longest under-water tunnel in the world is that under the Severn River in England. It is four and a half miles long and was opened in 1885 after twelve years of building. Several times there were breaks in this tunnel, followed by an inflow of water, and once a high tide flowed into the shafts and swamped the whole tunnel. Divers were employed to close the bulkhead doors, which were 1,000 feet from the shaft, but were unable to carry the rubber air pipes that far. At last the chief diver took the dangerous task, and tying a reservoir of compressed air on his back waded through the water and closed the doors.

The western railroads of the United States have many notable tunnels. There is one on the Great Northern in Montana which is over 6,000 feet in length. Mullen's tunnel, on the Northern Pacific Railroad, pierces the Continental Divide of the Rockies. American railway builders avoid tunnels as much as possible, substituting for them horseshoe curves and loop curves, rising one upon the other. These are less expensive than tunnels and give comparatively easy access to the mountain heights.

NATIONAL PATENT LAWS.

They are Issued in the Name of the United States—Granted to Any Rightful Inventor—No Separate Patents Issued—Manner of Taking Oath—Fees That Are Charged.

PATENTS are issued by and in the name of the United States under the seal of the Patent Office to any person who has invented any new and useful art, machine, manufacture or composition of matter, or any new improvement thereof, not used or known by others in this country, not already patented, and not printed or described in any publication of this or any foreign country prior to the discovery, and not on sale or in public use for more than two years before application unless same can be proved to be abandoned. Patents are granted to any person who, by his own industry, genius, effort or expense, has invented and brought forth any new and original design for manufacture, bust, statue, alto-relief or bas-relief; designs for printing woolen, silk, cotton or other fabric; any new or original ornament, impression, pattern print or object to be printed, painted, cast or otherwise to be reproduced; or any new shape of an article for manufacture not heretofore patented, produced or described in a printed publication.

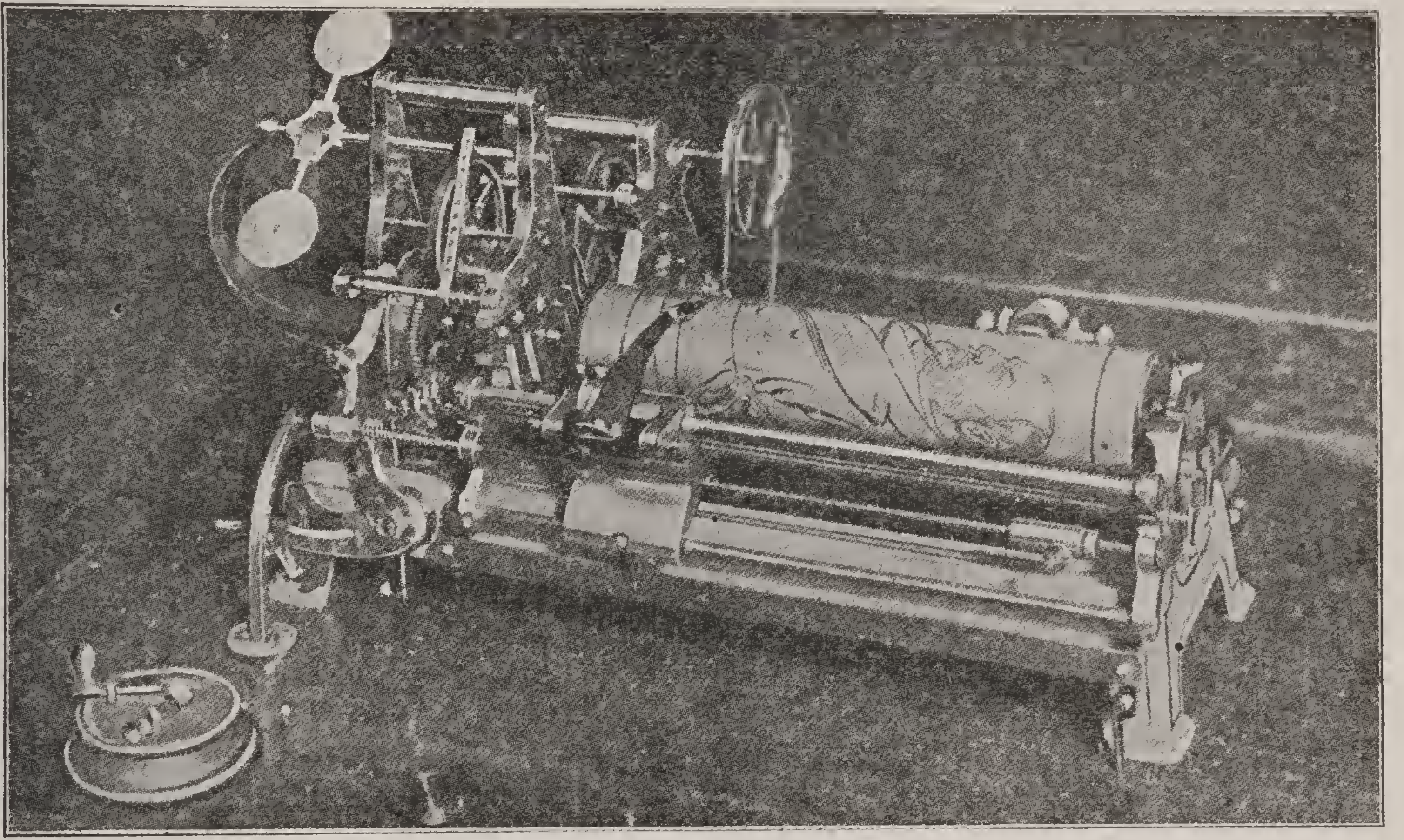
Every patent contains a grant to the patentee, his heirs or assigns for the exclusive right for seventeen years to the use of his discovery in the United States and the territories. If an inventor believes at the time of application that he is the discoverer of the invention, and part of his article for patent has already been known in a foreign country, the patent will not be denied, if it has not been patented or described in a printed publication

No Separate Patents.

When two persons work together on an invention they cannot receive separate patents on the several parts of such invention, but must have a joint patent, which cannot be claimed separately.

If a foreign patentee apply for a patent in this country the fact that the invention has been patented in a foreign country will not prohibit him from securing it unless the article patented has been put into use here more than two years prior to the time of application. But every patent thus applied for will expire at the time of the foreign patent, unless there are more than one, in which case the United States patent will expire at the same time as that which has the shortest unexpired time, and in no case will a patent run more than seventeen years.

Applications for a patent must be made in writing to the Commissioner of Patents, and at the same time there must be filed in the Patent Office a written description of the invention with its manner of making, construction, compounding and method of use in such clear and concise language as to enable any person versed in the science to which it pertains to be able to make it. In the case of a machine the principle must be explained and the best mode for its use be provided, so as to distinguish it and its improvements from other similar inventions. These specifications must be signed by the inventor and attested by at least two witnesses. When the nature of the case admits of a drawing of the invention the patentee must furnish one copy signed by himself and attested to by two witnesses, and when a model is possible the applicant, if required by the Commissioner, shall furnish a model of convenient size to exhibit to advantage the several parts of his invention or discovery.



A CURIOUS PATENT.

The machine by which great newspapers telegraph pictures to each other over ordinary telegraph wires, the same as news. Used by the New York *Herald* and Chicago *Times-Herald*.

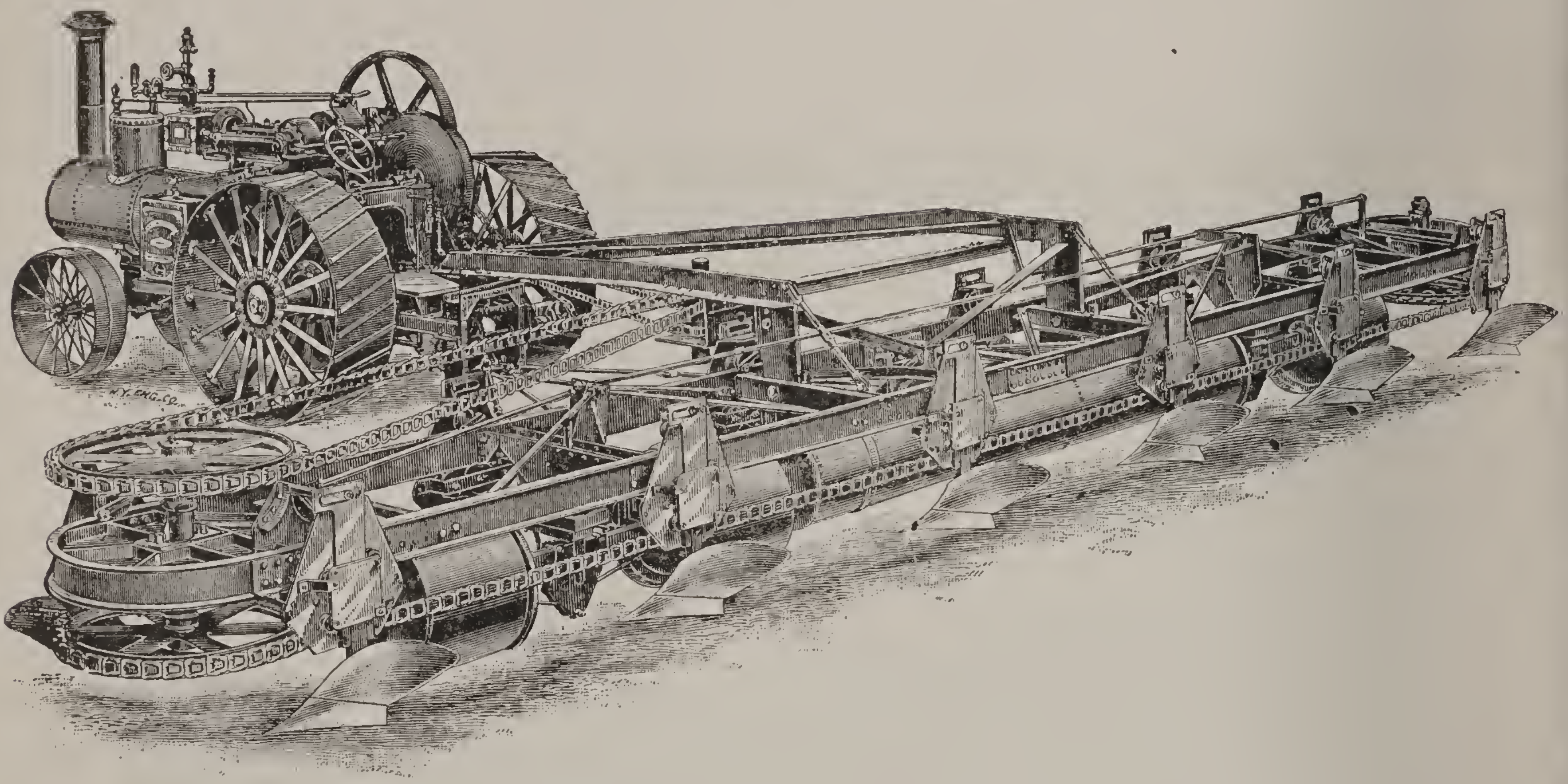
How to Make Oath.

The applicant for a patent must make an oath before some person in the United States authorized to administer it, or if residing abroad before some duly commissioned member of the diplomatic corps of the United States, stating that he believes his invention to be new and original, that he is the rightful discoverer and that the same has never before been known or used. After filing such an application, the patentee, if the Commissioner thinks an issue is justified, shall upon the payment of the lawful fees receive letters patent.

Assignments are lawful, and any patent or interest therein shall be assigned by an instrument in writing, and the patentee or his assigns may grant and convey an exclusive right under his patent to the whole or any specified district of the United States for the use or sale of his patent. In case of an error or inadvertence, where more is claimed by the patentee than he is entitled to, the patent becomes invalid. But by filling out certain papers showing such error to be by mistake or accident the reissue will be granted.

Explanation of a Caveat.

Caveats, under the patent law, are notices by which the caveator informs the Commissioner of Patents that he has an invention, in order to prevent a patent to another of the same alleged invention upon an application during the life of the caveat without notice to the caveator. A caveat may be secured on payment of a $10 fee and filing the distinguishing characteristics of the invention with the Patent Office, and will protect the inventor from any other inventor securing letters patent on such an invention during the life of the caveat, or one year. An alien in the United States has this privilege in common with an American citizen, provided he has lived here one year prior to filing the caveat and has declared his intention to become naturalized. Patent fees must be in advance, and are: On filing original application, $15. In design cases, for three years and six months, $10; seven years, $15; fourteen years, $30. Filing caveat, $10. Each application for reissue of a patent, $30. Filing each disclaimer, $10. For certified copies of patents, printed copies, etc., 10 cents per hundred words. Recording assignments, powers of attorney or other papers, three hundred words or under, $1; over three hundred words and under a thousand words, $2; over a thousand words, $3. Reasonable charges are made for copies of drawings. All letters in regard to patents should be addressed to the Commissioner of Patents, Washington, D. C.



A STEAM PLOW.

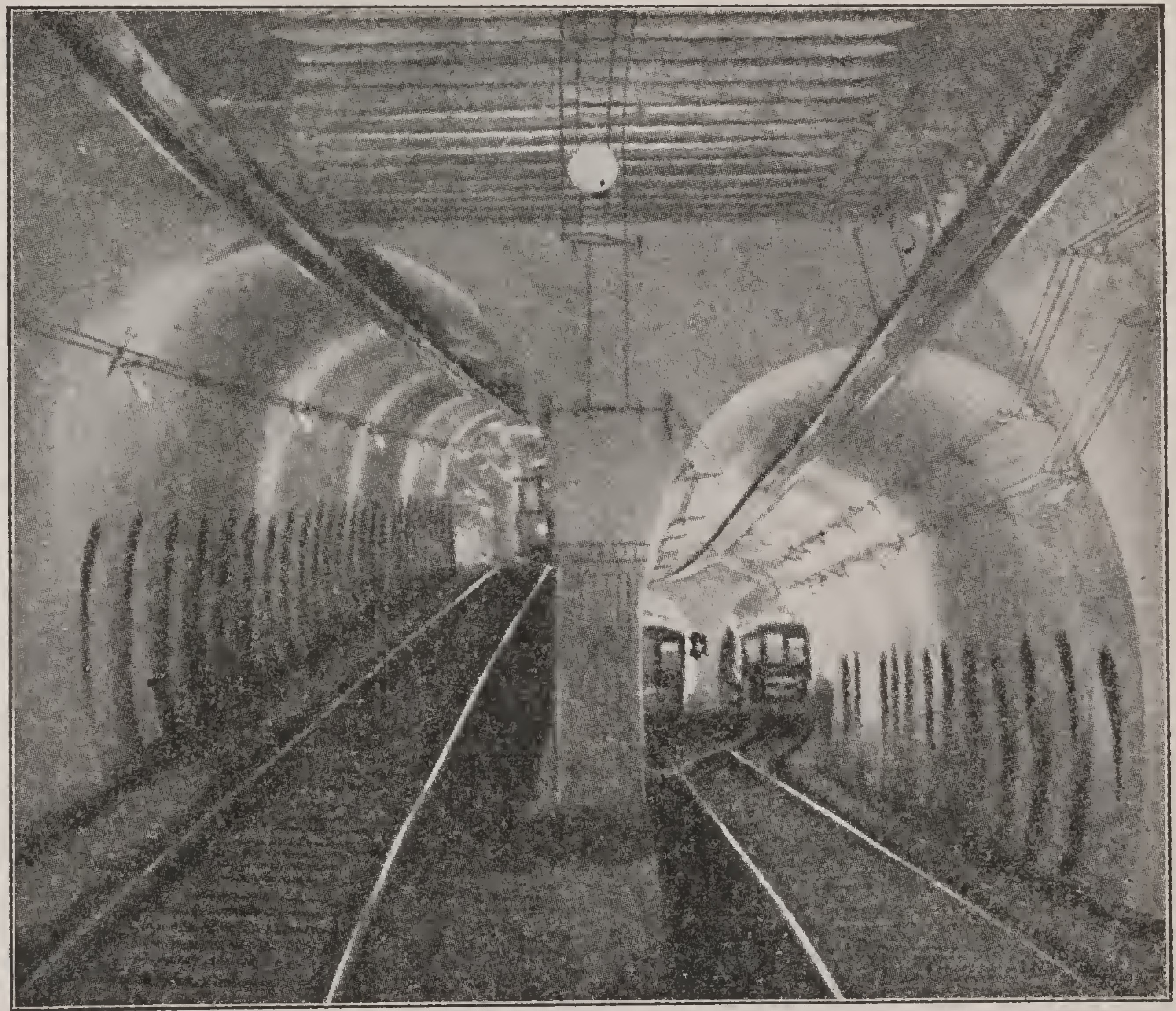
The travel of the plows is at right angles to the travel of the engine. The plow has been given a successful trial.

UNDERGROUND RAILROADS.

London's Great System Now in Use—Millions Expended on the Work—New York Starting to Build in this Way—Speed Which May be Attained.

FOR years the greatest engineers in the world have been trying to devise some scheme for removing the street car from public thoroughfares. This has been accomplished, and a problem which formerly seemed gigantic was made practical by Londoners. In the great metropolis of the world there are three underground railroads. These lines have a mileage of 105 miles, and it is the greatest and only system of its kind in the world. Something like $200,000,000 were expended in its construction, but the owners are being rapidly repaid for their great work.

The system is the work of several years and scores of contractors were employed before the monstrous task was completed. London, however, will not enjoy its distinction in this line alone. New York, which is its greatest rival in commerce and population, will also rival, if not surpass, it in the underground railroad proposition. The New York Rapid Transit contract is the largest single contract ever let, and is in the hands of John B. McDonald. It is a great undertaking when it is considered that this man attempts to solve in three years the transportation question for the most crowded city on earth; to dig twenty-one miles under streets which are alive with traffic



AN UNDERGROUND RAILWAY.

Showing the shape of the tunnel and the manner in which cars pass each other. This is the Boston method.

and threaded with conduits, sewers, and gas mains.

Its Speed.

According to the announcement of the promoters the new railroad, when completed, will make possible the traversing of a territory twenty-one miles in extent, in eighteen minutes. By the present system, it requires one hour. The line will be an electric road, with individual motive power fitted to each car, which is new for underground railroads. The entire right of way has been surveyed and even minor details have been arranged for. The tunnel will be fifty feet wide and seventeen feet high. It will traverse the city from the post-office to Ninety-sixth Street. The tunnel will be so constructed that four tracks will be accommodated. Two will be used for express service and two for local. Where the tunnel will run near the surface—at stations—the roof will be flat and constructed on pillars.

From the post-office to Thirty-third Street will be one main tunnel. At this point the tunnel will branch into two tunnels, owing to the Fourth Avenue tunnel, which begins at that point and runs near the surface. At Forty-second Street the single tunnel will be resumed and continue to the terminus at Ninety-sixth Street. The underground stations will be entered from the sidewalks. There will be separate staircases for entrance and exit. The station walls will be constructed of enameled brick and electric lights will be placed in niches in the walls.

MANUFACTURE OF SALT.

Apparatus for Mining Purposes—How it is Manufactured—Famous Wells at Manistee and Their Capacity.

KANSAS, once regarded as a desert, is now one of the best salt fields in the United States. In the vicinity of great forests, where saw mills are located, it is common to erect "salt blocks" in order to make use of the refuse of the saw mills as fuel. One of the states that thus manufactures a great deal of salt, and has employed one of the best methods of manufacture is Michigan. Near Manistee, underlying the great forest, is a stratum of rock salt from twenty-five to thirty feet thick and lying about 2,000 feet below the surface.

To mine this salt a derrick about eighty feet high is built over a point selected for a well and the work of driving commences. A ten-inch pipe is sunk by means of a sand pump to a depth of about 400 feet, and then within this pipe is inserted an eight-inch pipe, both being driven to the rock stratum. From the well thus constructed an air pump forces brine to the surface at the rate of 2,000 to 2,400 barrels in twenty-four hours.

Storage Cisterns.

As the brine is pumped up it is delivered to storage cisterns, whence it is pumped later on to be subjected to a system of boiling and evaporation to reduce it to granular salt. From the cisterns it is taken off to settlers where it is heated to 170 degrees F. and then allowed to cool so that the impurity of gypsum will be removed by precipitation. If this were not done the gypsum would form a coating on all the steam pipes and clog the machinery.

Then the brine is drawn off into a long box which extends over the end of a device called a "grainer." The grainer is a long shallow tank, in the bottom of which is a series of steam pipes. The brine being admitted to the grainers, the steam is turned on, the liquor soon reaches a high temperature, and rapid evaporation takes place. To assist in the formation of the grains of salt by evaporation, the brine is stirred by a series of paddles worked by a lever. The salt rapidly accumulates at the bottom of the grainer as the brine cools off, and in twenty-four hours there will be a layer six to eight inches deep. From this trough the salt is lifted by perforated shovels to a runway, whence it is shoveled into carts as soon as it is drained, and is taken to the storage bins and dumped.

GREAT SALT BEDS, WORKED BY THE NATIVES, NEAR MAKHOA, COREA.

Manistee Salt Wells.

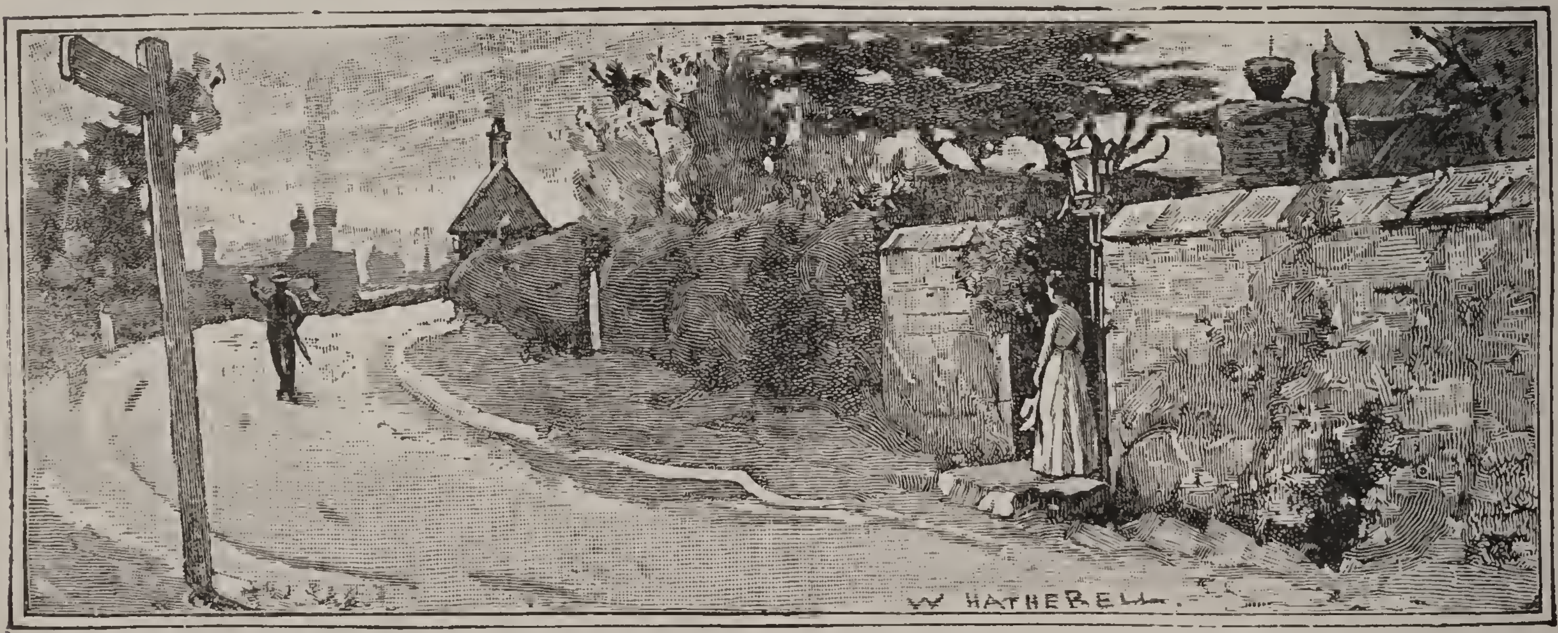
One plant near Manistee consists of five wells, three cisterns, each 18 feet wide by 100 feet long and 8 feet deep, and six settlers, 175 feet long and 8 feet deep, capable of holding 24,000 barrels of brine. When these cisterns and settlers are full they hold enough brine to manufacture 10,000 barrels of salt.

Part of the salt manufactured is treated to what is known as the "vacuum-pan" process. This consists of heating the brine in a large air-tight cylindrical boiler by steam heating process. Part of the air pressure is removed, which allows the brine to boil at 150 degrees. So rapid is the evaporation of the salt by this method that the grains fall to the bottom of the "pan," and by means of an endless belt "bucket" elevator the salt is automatically carried and dumped into drainage bins. Here it drains for about eighteen hours, and then is stored in bins. It is unusual to work the vacuum plants over twelve hours, since they should be cleaned out with fresh water frequently. Some plants have two pans, one for night and another for day work. Each can turn out from 600 to 700 barrels of salt a day.

Great Salt Bins.

Manufacturers of salt generally keep a large supply on hand in their bins, some of which are 200 or 300 feet in length. Frequently the salt becomes caked and hard. Then a gang of men must use shovels and picks to loosen it up for packing in barrels. The coarser grades do not pack so hard, but vacuum-pan salt sometimes becomes like a wall of marble. Then it is dangerous work to undermine it. To overcome the delay thus occasioned, ten-inch compressed-air driven augurs are used to drill holes in the stored salt. These augurs are mounted on trucks, and can readily be shifted about. A row of holes driven under the salt about ten inches from the floor to a depth of about six feet will bring down enough salt in a half-day's work to keep a gang of men busy packing for several days.

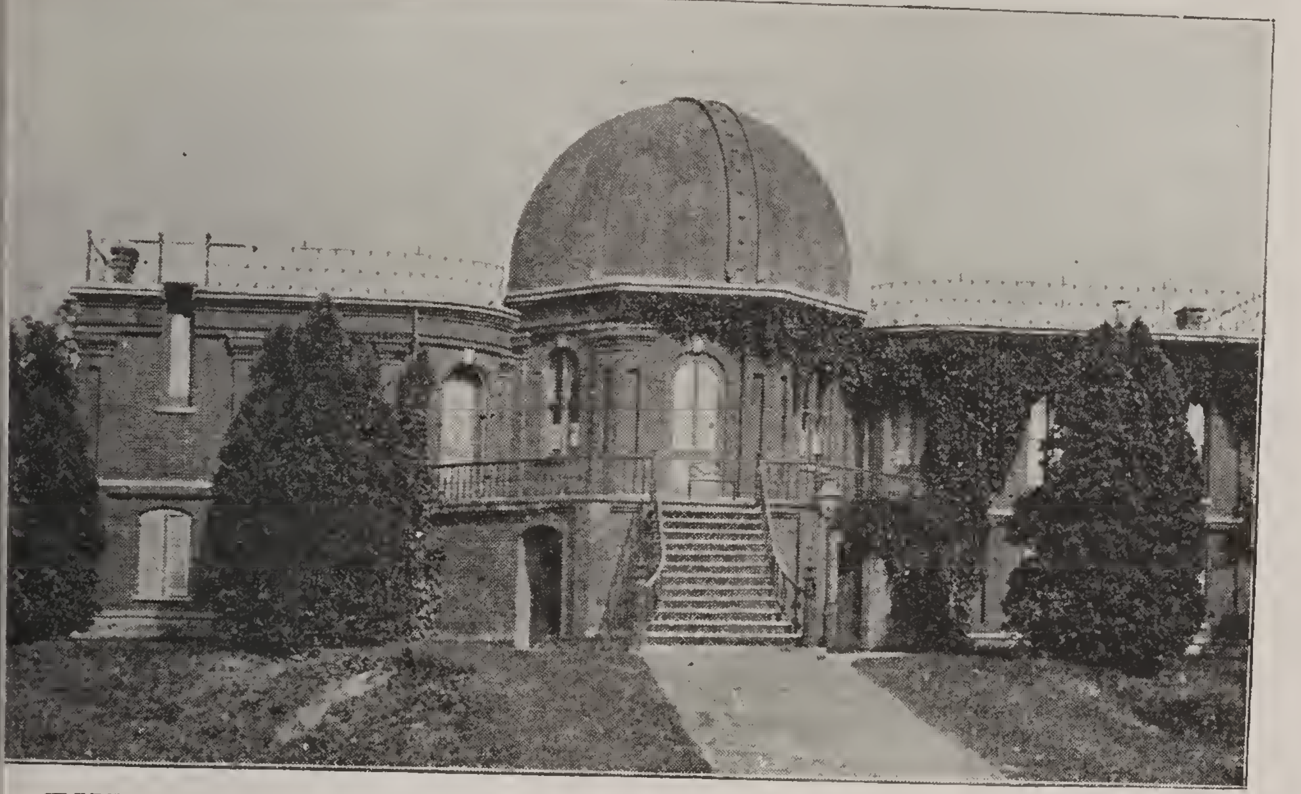
The salt wells of Kansas are found in the western part of the State, and those of Syracuse, New York, are quite famous. Vast quantities of salt are now obtained from Salt Lake, in Utah, by the evaporation and drying process. The salt producing States of the United States are New York, Michigan, Ohio, Louisiana, West Virginia, Nevada, California, Kansas and Utah.



OUR NATIONAL TIME.

Iow Solar Time is Determined—Regulating the Clocks of the Country—A Million a Year for Telegraph.

TIME is bought and sold throughout the United States to the extent of one million dollars' worth per year. The Western Union Telegraph Com- any is the monopolistic agent in this arketing of time. An important part



THE QUAINT OBSERVATORY AT VASSAR COLLEGE, POUGHKEEPSIE, NEW YORK.

Used by young women students. The stars are studied here.

the daily routine at the Naval Obser- tory in Washington is the determining d free distribution of the correct time noon each day. The government's aried experts make the computation, d communicate by the pressure of a tton the precise hour of noon to each the official departments in the city. e Western Union is permitted to keep its instruments in the observatory room from which the noontime message is flashed.

There is direct communication by beats from the official clock to the telegraphic instrument, so that the services of an operator are not required. Just before twelve each day all business must be taken off the wires controlled by the Western Union Company. Three minutes before noon, wire chiefs in each of the principal cities and the towns and cities leading to and from their larger sisters, cease sending or receiving messages, and devote themselves to switching on wires in such a way as to make an unbroken chain of communication from Washington around the uttermost boundaries of the United States. This is called an "unbroken national circuit." Ten seconds before the time bell strikes, there is silence; then a mighty throb, a titanic heartbeat from the foremost factor in modern commerce, and an electric current pulsates from east to west, from north to south, announcing the fact that the sun has passed over the seventy-fifth meridian and it is noon at Washington.

The manner in which the telegraph company reaps a rich harvest in the distribution of time is as follows: Those who have clocks and find it necessary to keep them right, to the fraction a of second, are willing to pay for such accuracy, and the Western Union first made the discovery that time is a profitable commodity. The clocks of the United States are kept correct by electricity for a nominal yearly fee, and in New York alone some 7,600 clocks are regulated daily and supplied with absolute solar time. For this service a charge of $15 a year per clock is made. This yields the telegraph company an annual income in the metropolis of $114,000. With 70,000 clocks to look after, it is easy to see how one mil ion dollars is obtained annually.

THE LICK OBSERVATORY, MT. HAMILTON, CALIFORNIA.

Containing the next to the largest refracting telescope in the world. The largest was at the Pari Exposition of 1900.

Rarely Seen by Public.

Most of these electric clocks are neve seen by the public. Dozens of them ar in the big public buildings of the large cities, in private offices, and in a singl newspaper office in New York som fifteen timepieces are regulated fror Washington.

The clocks that are set every noon in thousand cities and towns by the mer pressure of a button in Washington ar equipped with a peculiar electric contr vance, so that the current passes throug them and springs the hands of each tim piece simultaneously to the point c twelve. While correct time is usuall referred to as solar time, the government timekeepers do not reckon solely by the sun, but by the so-called "fixed" stars, which are so far distant that their position with relation to the earth does not change within months or even years. Thus star time is the only true time. The astronomical operator looks through his big telescope, and watching for a given star knows when that particular star will cross the plane of earth line of the meridian. As it crosses he records the moment it does so, the time being given him by a clock having a twenty-four hour dial.

Then consulting a printed table the operator finds at just what number of hours, minutes and seconds the star in question must actually have crossed the meridian plane. The table being absolutely correct the difference shown between it and the clock proves to what extent the latter is wrong.

The clock is never set right. Allowance is simply made in subsequent calculations for the errors discovered, and these errors amount only to an infinitesimal part of a second in many days. After this procedure the corrected time as taken from the clock is reduced to solar or sun time, which involves considerable figuring, inasmuch as the star year is one day longer than the sun year. The solar time clock in the observatory is consulted at this point and the extent to which this varies from the truth having been ascertained, allowance is made for the error in sending the new message throughout the country.

COAL MINING NEAR TAYUEN FU, CHINA.

THE LARGEST THINGS IN THE WORLD

HIGHEST NATURAL BRIDGE in the world is at Rockbridge, Virginia, being 200 feet high to the bottom of the arch.

LARGEST CIRCULATION of paper money is that of the United States, being 700,000,000, while Russia has 670,000,000.

LARGEST INSURANCE COMPANY in the world is the Mutual Life of New York City, having cash assets of $108,000,000.

MOST REMARKABLE ECHO known is that in the castle of Simonetta, two miles from Milan. It repeats the echo of a pistol sixty times.

LARGEST VOLCANO in the world is Etna. Its base is 90 miles in circumference; its cone 11,000 feet high. Its first eruption occurred 474 B. C.

LARGEST TREE in the world, as yet discovered, is in Tulare County, California. It is 275 feet high, and 106 feet in circumference at its base.

LARGEST DESERT is Sahara, in Northern Africa. Its length is 3000 miles and breadth 900 miles; having an area of 2,000,000 square miles.

LARGEST DIAMOND in the world is the Braganza, being a part of the Portuguese jewels. It weighs 1880 carats. It was found in Brazil in 1741.

TALLEST MAN was John Hale, of Lancashire, England, who was nine feet six inches in height. His hand was seventeen inches long and eight and one-half inches broad.

HIGHEST MONUMENT in the world is the Washington monument, being 555 feet. The highest structure of any kind is the Eiffel Tower, Paris, finished in 1889, and 989 feet high.

IT IS CLAIMED that crows, eagles, ravens and swans live to be 100 years old; herons, 59; parrots, 60; pelicans and geese, 50; skylarks, 30; sparrow hawks, 40; peacocks, canaries and cranes, 24.

GREATEST CATARACT in the world is Niagara, the height of the American Falls being 165 feet. The highest fall of water in the world is that of the Yosemite in California, being 2550 feet.

MOST ANCIENT CATACOMBS are those of the Theban kings, begun 4000 years ago. The catacombs of Rome contain the remains of about 6,000,000 human beings; those of Paris, 3,000,000.

LARGEST NUMBER OF CATTLE ever received in one year was that of Chicago in the year 1884, being 1,874,984 beeves, 30,223 calves, 5,640,625 hogs, 749,917 sheep, and 15,625 horses. It required 9000 trains of 31 cars each, which, if coupled together, would reach 2146 miles.

LARGEST PRODUCING FARM in the world lies in the southwest corner of Louisiana, owned by a northern syndicate. It runs one hundred miles north and south. The immense tract is divided into convenient pastures, with stations of ranches every six miles. The fencing alone cost nearly $50,000.

UNION ARCH of the Washington Aqueduct is the largest in the world, being 220 feet; 20 feet in excess of the Chester Arch across the Dee in England; 63 feet longer than that of the London Bridge; 92 feet longer than that at Neuilly on the Seine, and 100 feet longer than that of Waterloo Bridge, London. The height of the Washington Arch is 100 feet.

LARGEST SHIP ever built, the Great Eastern, recently broken to pieces and sold to junk dealers, was designed and constructed by Scott Russell, at Maxwell, on the Thames. Work on the giant vessel was commenced in May, 1854. She was successfully launched January 13, 1858. The launching alone occupied the time from November 3, 1857, until the date above given. Her total length was 680 feet; breadth, 118 feet; total weight when launched, 12,000 tons. Her first trip of any consequence was made to New York in 1859-60. She has been broken and sold for old iron.

IN 1775 there were only twenty-seven NEWSPAPERS published in the United States. Ten years later, in 1785, there were seven published in the English language in Philadelphia alone, of which one was a daily. The oldest newspaper published in Philadelphia at the time of the Federal convention was the *Pennsylvania Gazette*, established by Samuel Keimer, in 1728. The second newspaper in point of age was the *Pennsylvania Journal*, established in 1742 by William Bradford, whose uncle, Andrew Bradford, established the first newspaper in Pennsylvania, the *American Weekly Mercury*, in 1719. Next in age, but the first in importance, was the *Pennsylvania Packet*, established by John Dunlap in 1771. In 1784 it became a daily, being the first daily newspaper printed on this continent.

STATISTICS OF TWENTY LEADING LIBRARIES in this country show that, of over $500,000 spent, a little over $170,000 spent was devoted to books, while other expenses consumed $358,000. In the Mercantile Library of New York City it cost 14 cents to circulate a volume; in the Astor, 14½ cents are spent on each volume, or 27 cents on each reader; in Columbia College Library, 21½ cents per reader; in the Library Company of Philadelphia, 26 cents per volume, or 10 cents per head. The largest library in the world is the National Library of France, founded by Louis XIV., which now contains 1,400,000 books, 300,000 pamphlets, 175,000 manuscripts, 300,000 maps and charts, 150,000 coins and medals, 1,300,000 engravings and 100,000 portraits. The Library of Congress is the largest in this country.

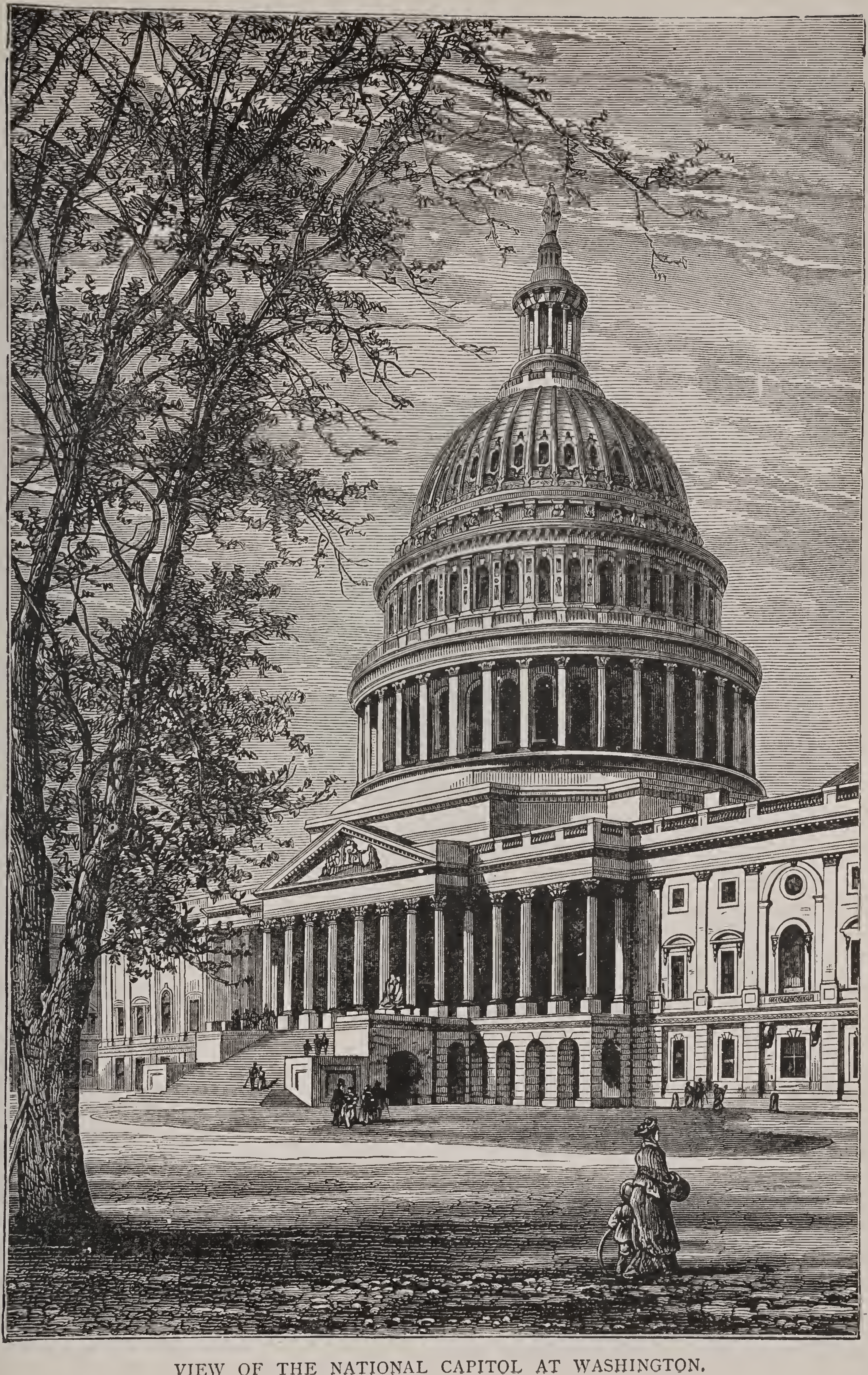
THE EIFFEL TOWER.

MOST EXTENSIVE MINES in the world are those of Freiberg, Saxony. They were begun in the twelfth century, and in 1835 the galleries, taken collectively, had reached the unprecedented length of 123 miles. A new gallery, begun in 1838, had reached a length of twelve miles at the time of the census of 1895. The deepest perpendicular mining shaft in the world is located at Prizilram, Bohemia. It is a lead mine, 3280 feet deep. The deepest coal mine in the world is near Tourney, Belgium; it is 3542 feet in depth, but, unlike the lead mine mentioned above, it is not perpendicular. The deepest hole ever bored into the earth is the artesian well at Potsdam, which is 5,500 feet in depth. The deepest coal shaft in the United States is located at Pottsville, Pa., 1800 feet. From this great depth 400 cars, holding four tons each, are hoisted daily. The deepest silver mine in the United States is the Yellow Jacket, one of the great Comstock system at Virginia City, Nevada; the lower levels are 2700 feet below the hoisting works.

LARGEST STONE BRIDGE on the face of the earth is that finished in May, 1885, at Lagang, China. Chinese engineers had sole control of its construction. It crosses an arm of the China Sea, is nearly six miles in length, is composed entirely of stone, and has 300 arches, each 70 feet high. It is the most colossal structure ever reared by man, yet we sneer at "heathen Chinee." The largest truss iron bridge in the world crosses the Firth of Tay, Scotland. It is 18,612 feet in length and composed of 85 spans. The longest wooden bridge in the world is that crossing Lake Ponchartrain, near New Orleans, La. It is a trestle-work 21 miles in length, built of cypress piles which have been saturated with creosote oil to preserve them. The highest bridge in the United States is over Kinzina Creek, near Bradford, Pa. It was built in 1882, has a total span of 2,051 feet and is 301 feet above the creek bed.

"CENTENNIAL OX," bred by Samuel Barkley of Somerset County, Pa., was the largest specimen of the bovine the world has ever seen. He weighed 4900 pounds the day he arrived in Philadelphia. This mountain of beef was of mixed stock, being short-horn, native "scrub," and Ayrshire, the short-horn predominating. After the exhibition was ended the giant ox was butchered and exhibited as "show beef" at Philadelphia during the holidays of 1876. A short-horn steer weighing 4100 pounds was slaughtered at Detroit in 1874. A. M. Meal, of Moberly, Mo., formerly owned the largest cow in the world. Mr. Meal disposed of her in 1883, the Cole Circus Company being the purchasers She weighed the day of sale 3296 pounds. Mr. John Pratt, of Chase County, Kan., was formerly the owner of a cow weighing 3200 pounds. She was of the common "scrub" stock and stood nineteen hands high.

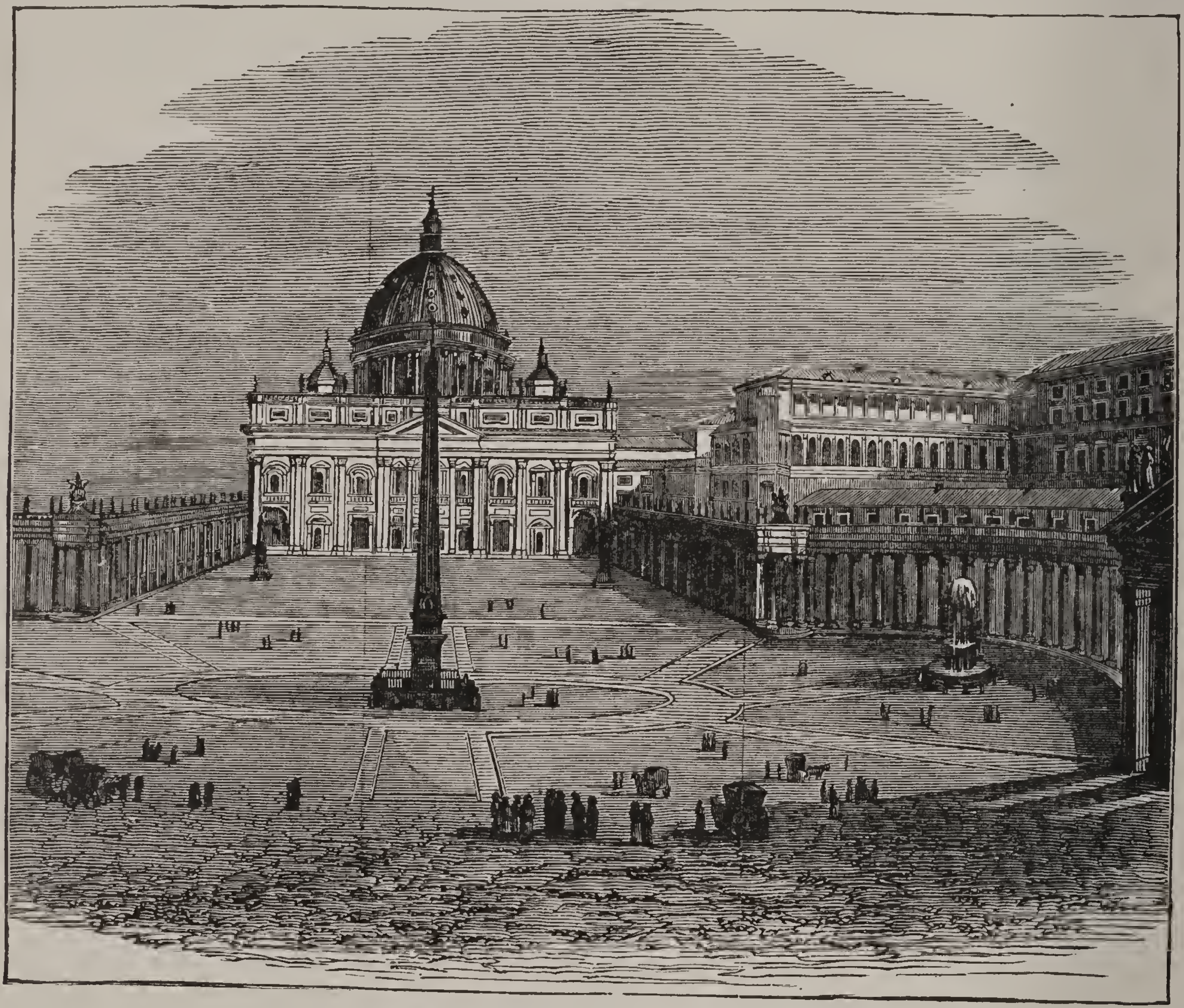
GREAT PYRAMID OF CHEOPS is the largest structure of any kind ever erected by the hand of man. Its original dimensions at the base were 762 feet square, and its perpendicular height in the highest point 486 feet; it covers four acres, one rood, and



VIEW OF THE NATIONAL CAPITOL AT WASHINGTON.

twenty-two perches of ground, and has been estimated by an eminent English architect to have cost not less than £30,000,000, which in United States currency would be about $147,200,000. Internal evidence proves that the great pyramid was begun about the year 2170 B. C., about the time of the birth of Abraham. It is estimated that about 5,000,000 tons of hewn stone were used in its construction, and the evidence points to the fact that these stones were brought a distance of about 700 miles from quaries in Arabia.

Largest and grandest temple of worship in the world is the St. Peter's Cathedral at Rome. It stands on the site of Nero's circus, in the northwest part of the city, and is built in form of a Latin cross. The total length of the interior is 612½ English feet; transept, 446½ feet; height of nave, 152½ feet; diameter of cupalo, 193 feet; height of dome from pavement to top of cross, 448 feet. The great bell alone without the hammer or clapper weighs 18,600 pounds, or over 9¼ tons. The foundation was laid in 1450 A. D. Forty-three Popes lived and died during the time the work was in progress. It was dedicated in the year 1826, but not entirely finished until the year 1880. The cost, in round numbers, is set down as $70,000,000.



ST. PETER'S AND THE VATICAN, ROME.

Capitol Building at Washington, D. C., is the largest building in the United States. The corner stone was laid December 18, 1793, by President Washington, assisted by other Masons. It was partially destroyed by the British in 1814. The present dome was begun in 1855 and finished in 1863. The flag of the United States first floated from it December 12, 1863. The cost of the entire building has been something over $13,000,000. Its length is 715 feet 4 inches; width, 324 feet. It covers 3½ acres of ground. The distance from the ground to the top of the dome is 307½ feet; diameter of the dome, 135½ feet—making fifth as to size with the greatest domes of the world.

Largest and costliest private mansion in the world is that belonging to Lord Bute, called Montstuart, and situated near Rothesay, England. It covers nearly two acres; is built in gothic style; the walls, turrets and balconies are built of stone. The immense tower in the center of the building is 120 feet high, with a balcony around the top. The halls are constructed entirely of marble and alabaster, and the rooms are finished in mahogany, rosewood and walnut. The fire-places are all carved marbles of antique design. The exact cost of this fairy palace is not known, but it has never been estimated at less than $8,000,000.

LARGEST BODY OF FRESH WATER in the world is Lake Superior. It is 400 miles long and 180 miles wide; its circumference, including the windings of its various bays, has been estimated at 1800 miles. Its area in square miles is 32,000, which is greater than the whole of New England, leaving out Maine. The greatest depth of this inland sea is 200 fathoms, or 1200 feet. Its average depth is about 160 fathoms. It is 636 feet above sea level.

FAMOUS CORLISS ENGINE, the largest ever constructed, and the one used to drive the machinery in the great hall at the Centennial of 1876, is now in the shops of the Pullman Car Company at Pullman, near Chicago, Ill. The writer is aware that this differs from other statements that have been made, it being generally supposed that the Emperor of Brazil bought the engine and removed it to his own country. He did talk of buying it, but the bargain was never consummated. This tireless giant works in an upright position, is over 40 feet high, of 1400 horse-power, and has two 40-inch cylinders and a 10-foot stroke.

LARGEST FERRY-BOAT ever constructed was named the Solano, and is now in use daily conveying trains across the Straits of Carquinez, between Benecia and Port Costa. The Solano is 460 feet long, 116 feet wide, and 20-foot depth of hold. She has 8 steel boilers, 4 rudders and a tonage of 3841 tons. On her decks are 4 railway tracks, with capacity for 48 ordinary freight cars and 2 locomotives, or 28 passenger coaches of the largest build.

HIGHEST BUILDING in the world, not counting the Eiffel Tower, the Washington Monument and the City Hall, Philadelphia, is the Cologne Cathedral. The height from the pavement to the top of the cupola is 511 feet. It is 511 feet long, exactly the same as the height, and 231 feet wide. It was begun August 15th in the year 1248, and was pronounced finished August 14, 1880, over 600 years after the corner-stone was laid.

HIGHEST MOUNTAIN on the globe is not, as is generally supposed, Mt. Everest, that honor belonging to a lofty peak named Mt. Hercules on the Isle of Papua, New Guinea, discovered by Capt. Lawson n 1881. According to Lawson, this monster is 32,763 feet in height, being 3781 feet higher than Mt. Everest, which is only 29,002 feet above the evel of the Indian Ocean.

LARGEST STATE in our grand republic is Texas, which contains 274,356 square miles, capable of sustaining 20,000,000 of people, and then it would not be more crowded than Scotland is at present. It has been estimated that the entire population of the globe could be seated upon chairs within the boundary of Texas, and each have four feet of elbow room.

MISSISSIPPI RIVER, from the source of the Missouri to the Eads jetties, is the LONGEST RIVER in the world. It is 4300 miles in length and drains an area of 1,726,000 square miles. The Amazon, which is, without doubt, the widest river in the world, including the Beni, is 4000 miles in length and drains 2,330,000 square miles of territory.

LARGEST CUSTOM-HOUSE in this or any other land is in New Orleans. It was begun in 1848 and over thirty years elapsed before it was finished and ready for use. It is built of Quincy granite, the interior being finished in finest marble. It has 111 rooms; height from the pavement to the top of the cornice is 80 feet, and to the top of the light on the dome 187 feet. The dome itself is 49 feet square and 61 feet high; estimated total cost of building, $4,900,000.

LARGEST HOTEL in the United States, and probably the largest in the world, is located at San Francisco, Cal. It is 9 stories high and cost $3,500,000. It is named the Palace, and has accommodations for 1,500 guests.

FINEST THEATRE in the world is in Paris. It is of solid stone, finished with marble floors, and covers about four acres of ground. La Scala, of Milan, has the largest seating capacity, while the Auditorium at Chicago, completed in 1889, seating 7000 people, ranks second in that respect.

A BLOCK OF COAL exhibited at the Iowa State Fair is thought to be the largest even mined; it weighed 7000 pounds.

LARGEST BOUND BOOK ever made is owned by Queen Victoria. It is 18 inches thick and weighs 63 pounds. It contains the jubilee addresses of congratulation.

LARGEST COAL BREAKER in the world is in operation at Edwardsville Colliery, Luzerne County, Pa. It prepares for market 4000 mine cars of coal every ten hours.

GREATEST ELEVATION ever attained by balloonists was 37,000 feet—about 7 miles. The aeronauts were James Glaisher, F. R. S., and Mr. Coxwell. The ascent was made September 5, 1862, at Wolverhampton, England.

LONGEST SINGLE SPAN OF WIRE in the world is used for a telegraph in India. It is stretched over the River Kistuah, between Bezorah and Sectauagrum. It is over 6000 feet long, and is stretched from the top of one mountain to the top of another, each mountain being nearly 2000 feet high.

Two largest castings in the world are in Japan, one at Nara and the other at Kamakura. Both are statues. The one at Nara is 53 feet and 9 inches from the base to the crown of the head. It was first cast in the eighth century, but was afterward destroyed and recast in the year 1223. The Kamakura statue is 47 feet high.

Sydney (Australia) lighthouse is provided with the largest electric light in the world. It has a power of 180,000 candles and may be seen from ships 50 miles at sea. The next largest is in the Palais d'Industrie and has a power of 150,000 candles. San Jose, California, has the most powerful electric light in the United States, one of 24,000 candle power.

Stone pavement in front of the residence of the late William H. Vanderbilt, in New York City, is made up of the largest slabs of flagging stone ever put in a single pavement. The stones were taken from quarries in Pike County, Pennsylvania, west of Port Jervis, N. Y., and from the Bigelow quarries in Ulster County, N. Y. The large slab immediately in front of the residence is the largest slab of its kind ever transported from any quarry and cost the millionaire $9200; the entire cost of the pavement was $47,000.

Greatest individual land proprietor in the world is Wilson Waddingham, who in 1887 purchased 163,000 acres of land in San Miguel County, New Mexico. His present landed interests amount to 1,500,000 acres, about 500,000 acres more than are claimed for the Duke of Westminster. In 1896 the largest producing farm in the world was one of the same number of acres (1,500,000) situated in the southwest corner of Louisiana. This immense farm is operated by a northern syndicate, with J. B. Watkins as manager.

Greatest fortress, from a strategical point of view, is the famous stronghold of Gibraltar. It occupies a rocky peninsula jutting out into the sea, about three miles long and three-quarters of a mile wide. One central rock rises to a height of 1435 feet above the sea-level. Its northern face is almost perpendicular, while its east side is full of tremendous precipices. On the south it terminates in what is called Europa Point. The west side is less steep than the east, and between its base and the sea is the narrow, almost level span on which the town of Gibraltar is built. The fortress is considered impregnable to military assault. The regular garrison in time of peace numbers about 7000.

Biggest cavern is the Mammoth Cave, in Edmonson County, Kentucky. It is near Green River, about six miles from Cave City, and twenty-eight from Bowling Green. The cave consists of a succession of irregular chambers, some of which are large, situated on different levels. Some of these are traversed by the navigable branches of the subterranean Echo River. Blind fish are found in its waters.

Largest hanging bell in the world is in a Buddhist monastery, near Canton, China. It is eighteen feet high and forty-five feet in circumference, and is of solid bronze. It is one of the eight great bells which were cast by command of the Emperor Yung-lo about A. D. 1400, and is said to have cost the lives of eight men, who were killed during the process of casting. The whole bell, both inside and out, is covered with an inscription in embossed Chinese characters about half an inch long, covering even the handle, the total number being 84,000. The characters tell a single story—one of the Chinese classics.

Largest stationery engine in the world is at the famous zinc mines at Friedensville, Pa. It is known as the "President," and there is no pumping engine in the world that can be compared with the monster. The number of gallons of water raised every minute is 17,500. The driving wheels are thirty-five feet in diameter and weigh forty tons each. The sweep rod is forty feet long, the cylinder 110 inches in diameter, and a piston-rod eighteen inches in diameter, with a ten-foot stroke.

Largest gun in the United States is the 20-inch Rodman, smooth bore, at Fort Hamilton, New York Harbor. Its dimensions are as follows: Extreme length, $243\frac{5}{8}$ inches; maximum diameter, 64 inches; minimum diameter, 34 inches; length of bore in calibers, 10.50 inches. The service charge is 200 pounds of powder, and the weight of the projectile is 2000 pounds. There is also a wrought iron lined rifled $12\frac{1}{2}$ inch gun at Sandy Hook. Its weight is 89,350 pounds; extreme length, $262\frac{2}{3}$ inches; maximum diameter, 55 inches; minimum diameter, 27.55 inches; length of the bore in calibers, 18.53 inches. The gun is used for experimental purposes in testing powder.

The Longest Tunnels in the World.

Mount St. Gothard Tunnel, Italy, is 48,840 feet long, or nearly ten miles long, and the longest in the world.

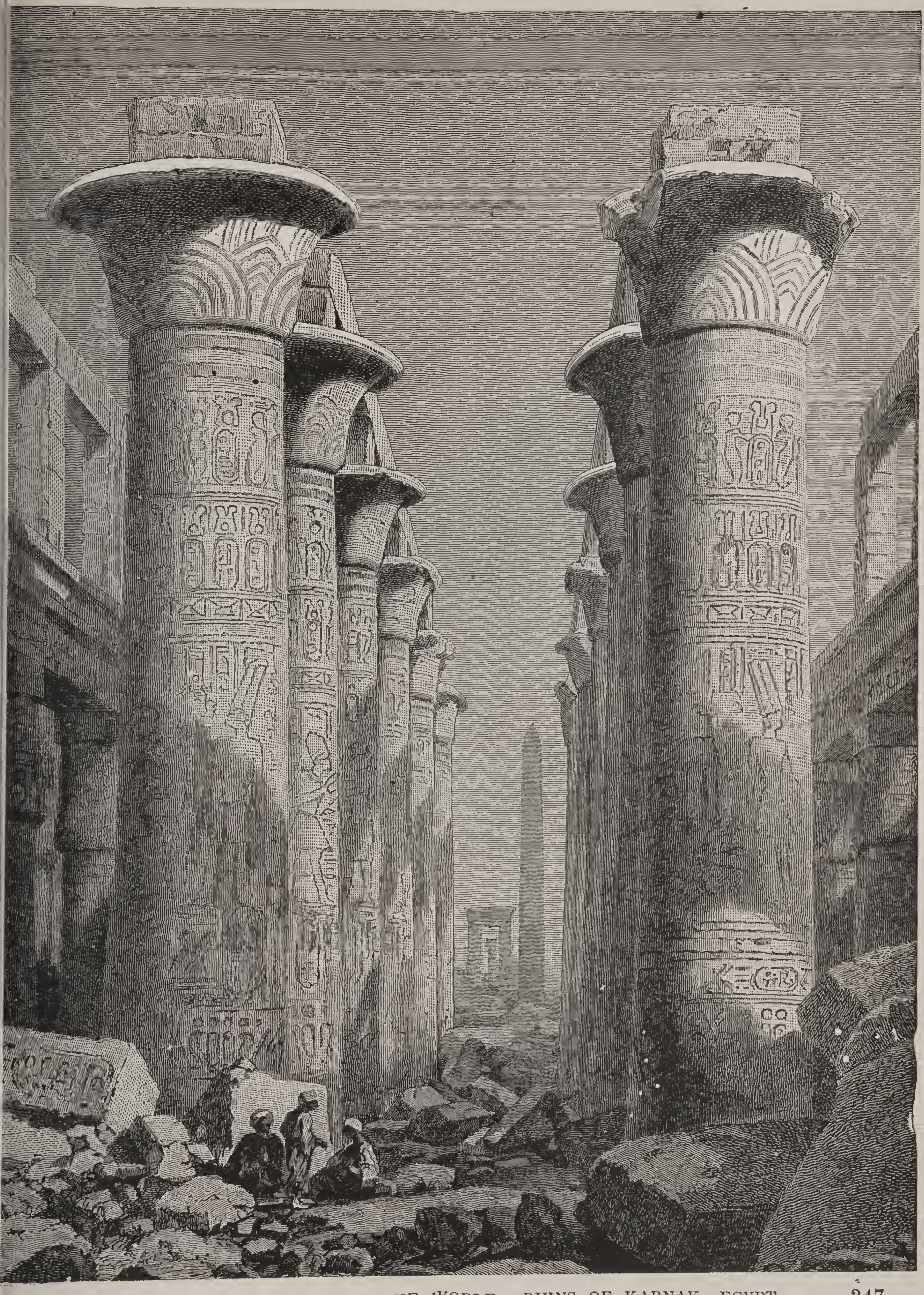
Mount Cenis Tunnel, Italy, is 39,840 feet long, or about seven miles long.

Hoosac Tunnel, Massachusetts, is 25,031 feet long, or about four and one-half miles.

Nochistongo Tunnel is 21,659 feet long or about four miles.

Sutro Tunnel is 20,028 feet long, or four miles.

Thames and Medway, England, is 11,880 feet long, or about two miles.



LARGEST PILLARS IN THE WORLD—RUINS OF KARNAK, EGYPT.

Largest Steam Hammer in the World.

The greatest steam hammer in the world, constructed at the Bethlehem Iron Company's works for the manufacture of armor plate, was designed after the hammer of Schneider & Co., of Le Crusot, France, which, next to this one, is the largest hammer in the world. It has a stroke of 125 tons, while the Schneider hammer is only capable of striking a 100-ton blow. The hammer is used for forging ingots into armor plates. These ingots are cast of metal weighing from 100 to 150 tons, and by this stupendous piece of mechanism are forged into the desired sizes by 125-ton blows.

The hammer stands in the centre of a very large building and over a year was spent in its construction. A pit 58 by 62 feet was dug for the foundation and on walls 30 feet high the anvil stands. To give the foundation a certain elasticity a layer of 20 steel slabs on top of Ohio white oak timbers was made and the surface was rendered perfectly smooth. It was of course entirely out of the question to cast in a single piece the iron required and the anvil was built by depositing on top of the steel slabs and their timbers 22 blocks of solid cast iron. The average weight of these blocks is 70 tons, and the entire weight of the mass of iron and steel forming the anvil and foundation is nearly 1800 tons.

The hammer itself is a majestic looking structure, superimposed over the cyclopean mass of iron, forming the anvil—huge, substantial and powerful, rising to a height of 90 feet.

Most Notable Bridges of the World.

Brooklyn Bridge was Commenced, under the direction of J. Roebling, in 1870, and completed in about thirteen years. The cost of building was nearly $15,000,000. (The dimensions are given elsewhere.)

Cantilever Bridge, over the Niagara, is built almost entirely of steel. Its length is 910 feet, the total weight is 3000 tons, and the cost was $900,000.

First Niagara Suspension Bridge was built by Roebling in 1852–53, at a cost of $400,000. It is 245 feet above water, 821 feet long, and the strength is estimated at 1200 tons.

Bridge at Havre de Grace, over the Susquehanna, is 3271 feet long, and is divided into twelve wooden spans, resting on granite piers.

Britannia Bridge crosses the Menai strait, Wales, at an elevation of 103 feet above high water. It is of wrought iron, 1511 feet long, and was finished in 1850. Cost, $3,008,000.

New London Bridge is constructed of granite, from the designs of L. Rennier. It was commenced in 1824, and completed in about seven years, at cost of $7,291,000.

Old London Bridge was the first stone bridg
It was commenced in 1176 and completed in 120
Its founder, Peter of Colechurch, was buried in th
crypt of the chapel erected on the centre pier.

Coalbrookdale Bridge, England, is the fir
cast-iron bridge. It was built over the Severn i
1779.

Bridge at Burton, over the Trent, was formerl
the longest bridge in England, being 1545 feet. It
now partly removed. Built in the twelfth century.

The Rialto, at Venice, is said to have been bui
from the designs of Michael Angelo. It is a sing
marble arch, 98½ feet long, and was completed i
1591.

Bridge of Sighs, at Venice, over which co
demned prisoners were transported from the hall
judgment to the place of execution, was built in 158

Bridge of the Holy Trinity, at Florence, wa
built in 1569. It is 322 feet long, constructed
white marble, and stands unrivaled as a work of ar

Covered bridge at Pavia, over the Ticino, wa
built in the fourteenth century. The roof is held b
100 granite columns.

St. Louis Bridge, over the Mississippi, is 15
feet long, exclusive of approaches. There are thre
arched spans of cast steel, the centre arch being 5
feet, with a rise of 47½ feet; and the side spans 5
feet each, with a rise of 46 feet. The width on to
between rails, is 50 feet. The piers rest on the be
rock of the river, 136 feet below high water mar
Captain James B. Eads was the engineer.

Rush Street Bridge, Chicago, Ill., erected i
1884, at a cost of $132,000 is the largest general traffi
drawbridge in the world. Its roadway will accom
date four teams abreast, and its footways are seve
feet wide.

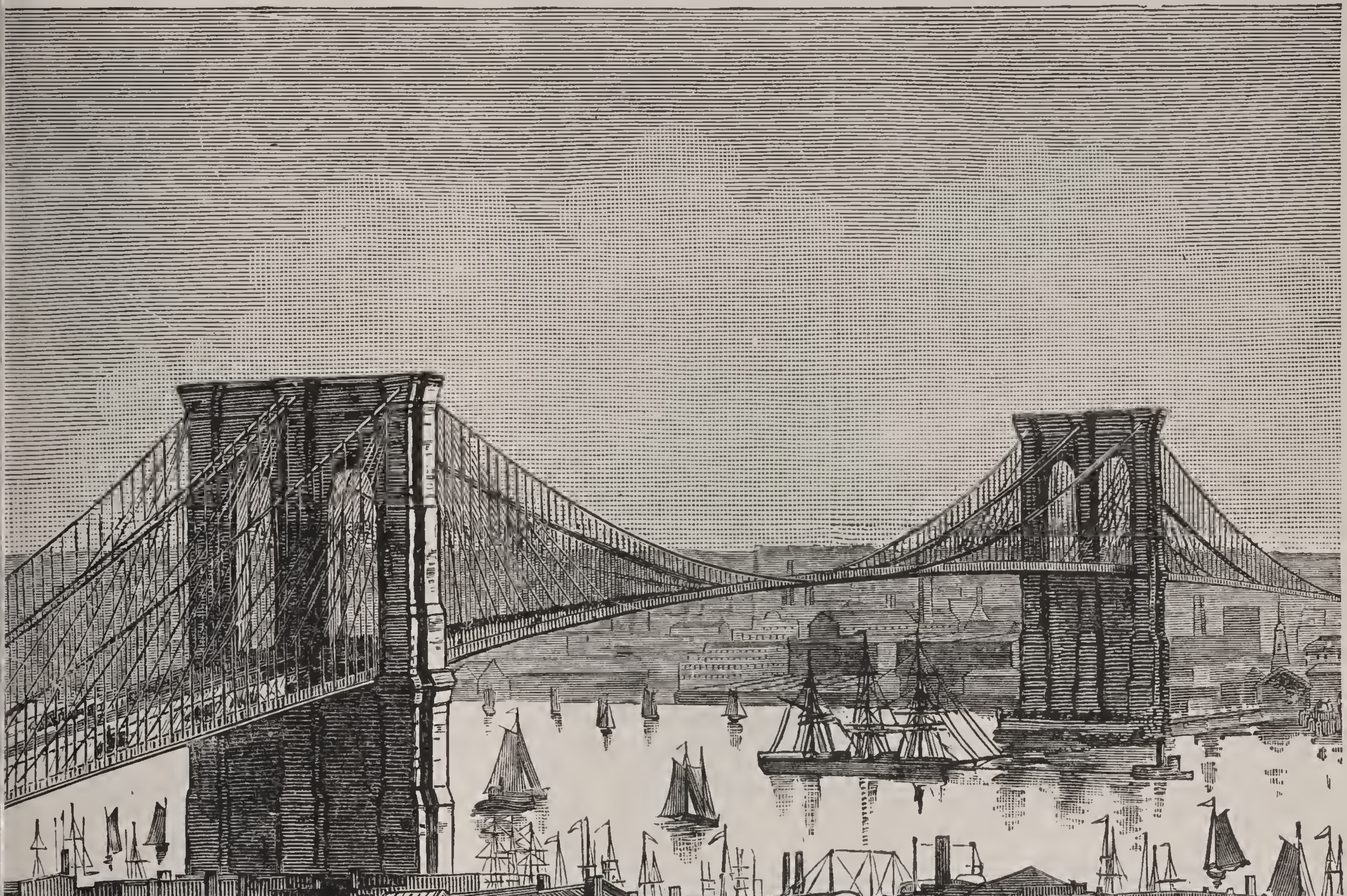
Victoria Bridge, Montreal, one of the mos
famous in the world, is nearly two miles in length

Cleveland (O.) Viaduct is 3211 feet in length
64 feet wide, 42 feet of which is roadway; the draw
bridge is 332 feet in length, 46 feet wide, and is 6
feet above ordinary stage of water.

The Greatest City in the World.

London, England, is the greatest city the worl
ever saw. It covers within the fifteen miles radiu
of Charing Cross (Strand) 700 miles. It number
within these boundaries 5,656,000 of inhabitants. I
comprises over 2,000,000 foreigners from every
quarter of the globe. It contains more Roman
Catholics than Rome itself; more Jews than the

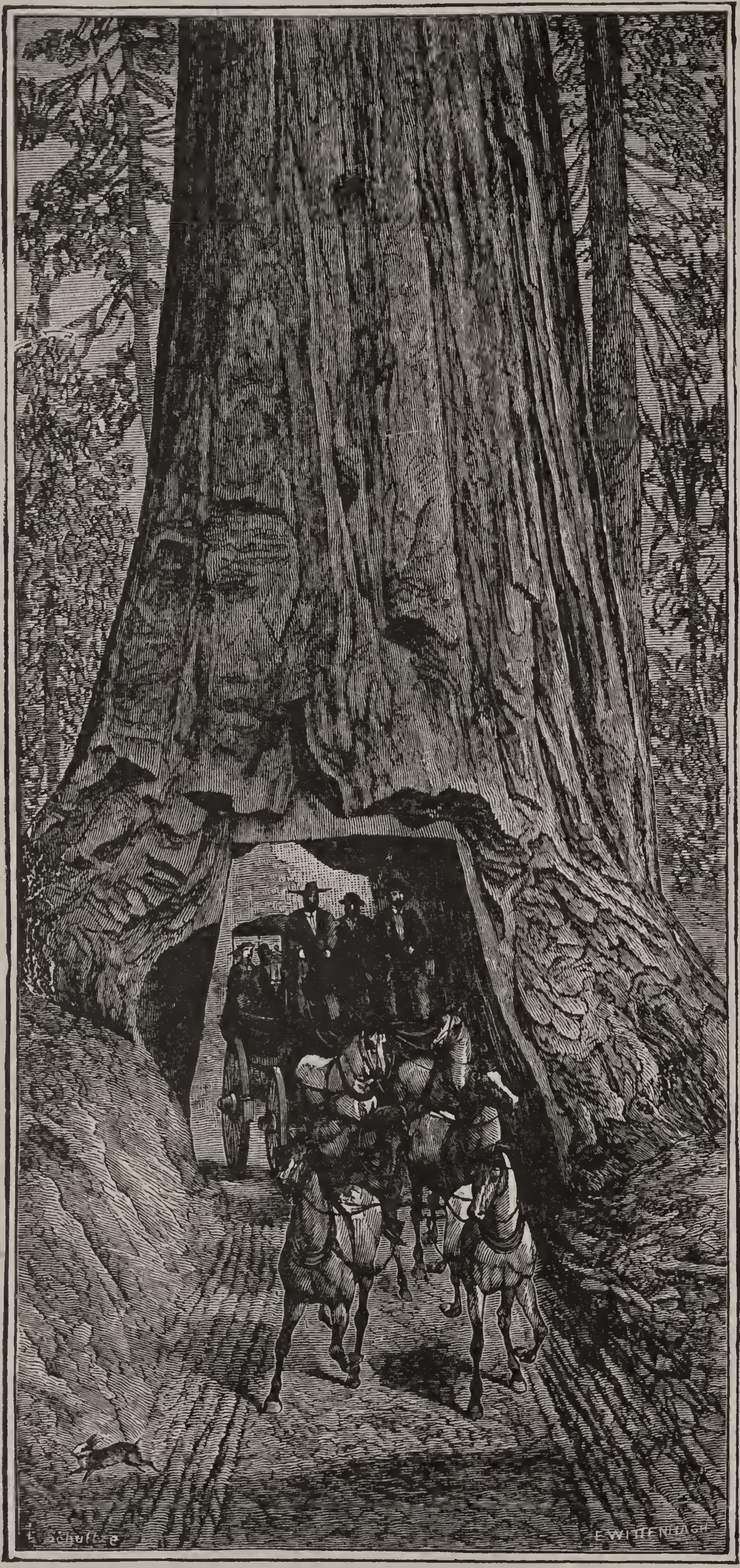
hole of Palestine ; more Irish than Dublin ; more cotchmen than Edinburgh ; more Welshmen than ardiff ; more country-raised persons than the coun- es of Devon, Warwickshire and Durham combined.



THE GREAT SUSPENSION BRIDGE BETWEEN NEW YORK AND BROOKLYN.

Has a birth every five minutes, has a death in it very eight minutes ; has seven accidents every day n its 8000 miles of streets ; has on an average o miles of streets opened and 15,000 new houses uilt in every year.

London has 49,000 persons added annually (by birth) to its population ; has over 1000 ships and 10,000 sailors in its port every day ; has as many beer shops and gin palaces as would, if placed side by side, stretch from Charing Cross to Portsmouth, a distance of seventy-eight miles ; has 38,000 drunkards annually brought before its magistrates ; has seventy miles of open shops every Sunday ; has influence with all parts of the world represented by



ONE OF THE BIG TREES OF CALIFORNIA.

a yearly delivery in its postal district of 298,000,000 of letters. Eight hundred and fifty trains pass Clapham junction every day, and the transportation (underground) railroad runs 1211 trains every day.

The London Omnibus Company have over 700 'busses, which carry 56,000,000 passengers annually. It is more dangerous to walk the streets of London than to travel by railroad or to cross the Atlantic from New York to Liverpool. In 1886, 130 persons were killed and 2000 injured by vehicles in the streets. There are in London 15,000 police, 15,000 cabmen, 15,000 persons connected with the post-office. The cost of gas for lighting London annually is $3,000,000. London has 400 daily and weekly newspapers. The ancient city of London was first founded by Brute, the Trojan, in the year of the world 2832, so that since the first building it is 3007 years old. The drainage system of London is superb, and the death rate very low.

The Largest Trees in the World.

The big trees of Calaveras and Mariposa Counties, in California, belong to the same genus as the common redwood. This giant of the Sierras is not a handsome tree, either when young or aged; the branches are short, the spray less graceful than the coast redwood, the leaves small and awl-shaped, but the cones are several times larger, and the wood is of a duller reddish hue. The forests were first seen by white men in the spring of 1852, when a hunter named Dowd conducted a party of miners to the locality where the big trees grew. In the several groves where they have been found, there are many trees from 275 to 335 feet high, and from 25 to 34 feet in diameter. The area of Mariposa Grove is two miles square, and it contains 427 of the monster trees.

The largest in the Calaveras Grove is "The Keystone State," and is 325 feet high, and its girth six feet from the ground is 45 feet. There are some in the Mariposa Grove which are not so high, but which have a greater circumference. "The Grizzly Gian ," for example, being 93 feet at the ground, and over 64, eleven feet above. Some dozen miles south of the Mariposa Grove is the Fresno Grove, which is said to contain about 600 trees, the largest 81 feet in circumference; while about fifty miles north of the Calaveras, in Placer county, a small grove has been discovered. Careful computations have been made of the ages of these trees, and some cautious scientists admit, in regard to one of them, that "its age cannot have exceeded 1300 years!"

The Largest Park in the World.

The Yellowstone National Park extends sixty-five miles north and south and fifty-five miles east and west, comprising 3575 square miles, and is 6000 feet or more above sea level. Yellowstone Lake, twenty miles by fifteen, has an altitude of 7788 feet. The mountain ranges which hem in the valleys on every side rise to the height of 10,000 to 12,000 feet, and are always covered with snow. This great park contains the most striking of all the mountains, gorges, falls, rivers and lakes in the whole Yellowstone region.

The springs on Gardiner's River cover an area of about one square mile, and three or four square miles thereabout are occupied by the remains of springs which have ceased to flow. The natural basins into which these springs flow are from four to six feet in diameter and from one to four feet in depth. The principal ones are located upon terraces midway up the sides of the mountain. The banks of the Yellowstone River abound with ravines and canyons, which are carved out of the heart of the mountains through the hardest rocks.

The most remarkable of these is the canyon of Tower Creek and Column Mountain. The latter, which extends along the eastern bank of the river for upward of two miles, is said to resemble the Giant's Causeway. The canyon of Tower Creek is about ten miles in length, and is so deep and gloomy that it is called "The Devil's Den." Where Tower Creek ends the Grand Canyon begins. It is twenty miles in length, impassable throughout, and inaccessible at the water's edge, except at a few points. Its rugged edges are from 200 to 500 yards apart, and its depth is so profound that no sound ever reaches the ear from the bottom.

The Grand Canyon contains a great multitude of hot springs of sulphur, sulphate of copper, alum, etc. In the number and magnitude of its hot springs and geysers, the Yellowstone Park surpasses all the rest of the world. There are probably fifty geysers that throw a column of water to the height of from 50 to 200 feet, and it is stated that there are not fewer than 5000 springs.

The temperature of the calcareous springs is from 160 to 170 degrees, while that of the others rises to 200 or more. The principal collections are the upper and lower geyser basins of the Madison River and the calcareous springs on Gardiner's River. The great falls are marvels to which adventurous travelers have gone only to return and report that they are parts of the wonders of this new American wonderland.

The Washington Monument.

The corner-stone was laid by President Polk, July 4, 1848, and December 6, 1884, the cap-stone was set in position. The foundations are 126½ feet square and 36 feet 8 inches deep. The base of the monument is 55 feet 1½ inches square, and the walls 15 feet ¼ inch thick. At the 500-foot mark, where the pyramidal top begins, the shaft is 34 feet 5½ inches square and the walls are 18 inches thick.

The monument is made of blocks of marble 2 feet thick, and it is said there are over 18,000 of them. The height above the ground is 555 feet. The pyramidal top terminates in an aluminum tip, which is 9 inches high and weighs 100 ounces. The mean pressure of the monument is 5 tons per square foot, and the total weight, foundation and all, is nearly 81,000 tons. The door at the base, facing the capitol, is 8 feet wide and 16 feet high, and enters a room 25 feet square.

An immense iron frame-work supports the machinery of the elevator, which is hoisted with steel wire ropes, 2 inches thick. At one side begin the stairs, of which there are 50 flights, containing 18 steps each. Five hundred and twenty feet from the base there are 8 windows, 18x24 inches, 2 on each face. The area at the base of the pyramidal top is 1187¼ feet, space enough for a six-room house, each room to be 12x16 feet. The Cologne Cathedral is 511 feet high; the pyramid of Cheops, 486; Strasburg Cathedral, 474; St. Peter's at Rome, 448; the Capitol at Washington, 306, and Bunker Hill Monument, 221 feet. The Washington Monument, therefore, is the highest structure in the world, except the temporary Eiffel Tower. The total cost was not far from $1,500,000.

Height of Principal Monuments and Buildings.

Places.	Names.	Feet.
Paris	Eiffel	1000
Wash., D. C.	Washington Monument	555
Philadelphia	Public Buildings	545
Egypt	Pyramid of Cheops	486
Belgium	Antwerp Cathedral	476
France	Strasburg Cathedral	474
Egypt	Pyramid of Cephrenes	456
Rome	St. Peter's Church	448

Places.	Names.	Feet.
Germany	St. Martin's Church at Landshut.	411
England	Salisbury Cathedral	400
England	St. Paul's Church, London	365
Italy	Cathedral at Florence	386
Lombardy	Cathedral at Cremona	397
Germany	Church at Fribourg	386
Spain	Cathedral of Seville	360
Lombardy	Cathedral of Milan	355
Holland	Cathedral of Utrecht	356
New York	Trinity Church	284
China	Porcelain Tower, Nankin	260
Paris	Church of Notre Dame	224
Massachusetts	Bunker Hill Monument	221
Italy	Leaning Tower of Pisa	179
Baltimore	Washington Monument	175
Paris	Monument, Place Vendome	153
Italy	Trojan's Pillar, Rome	151
Paris	Obelisk of Luxor	110

Capacity of the Largest Churches and Hall

St. Peter's Cathedral	Rome	54,000
Cathedral of Milan	Milan	37,000
St. Paul's Church	Rome	32,000
St. Paul's Cathedral	London	25,000
Church of St. Petronio	Bologna	24,000
Cathedral of Florence	Florence	24,000
Cathedral of Antwerp	Antwerp	24,000
Mosque of St. Sophia	Constantinople	23,000
St. John's Lateran	Rome	22,000
Cathedral of Notre Dame	Paris	21,000
Cathedral of Pisa	Pisa	13,000
Church of St. Stephen	Vienna	12,000
Church of St. Dominic	Bologna	12,000
Church of St. Peter	Bologna	11,400
Cathedral of Vienna	Vienna	11,000
St. Peter's Cathedral	Montreal	10,000
Auditorium	Chicago	8,000

The Highest Mountains.

	Feet.
Kunchainyunga, Himalayas	28,170
Sorata, Andes	25,380
Illimani, Bolivia	21,780
Chimborazo, Ecuador	21,444
Hindoo-Koosh, Afghanistan	20,600
Cotopaxi, Ecuador	19,408
Antisana, Ecuador	19,150
St. Elias, British America	18,000
Popocatapetl, Mexico	17,735
Mt. Roa, Hawaii	16,000
Mt. Brown	15,900
Mont Blac	15,776
Mowna Roas, Owhyhee	15,700
Mt. Rosa, Alps, Sardinia	15,550
Pinchinca, Ecuador	15,200
Mt. Whitney, California	15,000
Mt. Fairweather, Alaska	14,796
Mt. Shasta, California	14,450
Pike's Peak, Colorado	14,320
Mt. Ophir, Sumatra	13,800
Fremont's Peak, Wyoming	13,570
Long's Peak, California	13,400
Mt. Ranier, Washington	13,000
Mt. Ararat, Armenia	12,700
Peak of Teneriffe, Canaries	12,236
Miltsin, Morocco	12,000
Mt. Hood, Oregon	11,570
Simplon, Alps	11,542
Mt. Lebanon, Syria	11,000
Mt. Perdu, France	10,950
Mt. St. Helen's, Oregon	10,158
Mt. Etna, Sicily	10,050
Olympus, Greece	9,754
St. Gothard, Alps	9,080
Mt. Sinai, Arabia	8,000
Pindus, Greece	7,677
Black Mountain, New Caledonia	6,467
Mt. Washington, New Hampshire	6,234
Mt. Marcy, New York	5,467
Mt. Hecla, Iceland	5,000
Ben Nevis, Scotland	4,400
Mansfield, Vermont	4,280
Peaks of Otter, Virginia	4,260
Ben Lawers, Scotland	4,030
Parnassus, Greece	3,850
Vesuvius, Naples	3,932
Ben Lomond, Scotland	3,280
Mt. Carmel	2,000

Height of Twenty-four of the Loftiest Volcanoes of the World.

Name of Volcano.	Height in feet.	Where Located.
Sahama	23,000	Peru.
Llullaillac	21,000	Chili.
Arequipa	20,500	Peru.
Cayambi	19,813	Equador.
Cotopaxi	19,500	Peru.
Antisana	19,200	Ecuador.
San Jose	18,150	Chili.
Mt. St. Elias	17,900	Alaska.
Popocatepetl	17,884	Mexico.
Orizaba	17,370	Mexico.
Altar	17,126	Ecuador.
Sangai	17,120	Ecuador.
Klintcheoskaia	16,512	Kamtschatka.
Iztacihuate	15,700	Mexico.
Toluco	15,500	Mexico.
Shasta	14,400	United States.

Name of Volcano.	Height in feet.	Where Located.
Fujiyama	14,000	Japan.
Mauna Kea	13,953	Sandwich Islands.
Mauna Loa	13,760	Sandwich Islands.
Teneriffe	12,236	Canary Islands.
Mt. St. Helens	12,000	United States.
Mt. Hood	11,225	United States.
Peak of Tahiti	10,895	Friendly Islands.
Mt. Etna	10,874	Sicily.

Three of the best known volcanoes of the world, Vesuvius, 3978 feet; Hecla, 3970 feet, and Stromboli, 3000 feet, are of much less elevation than many others altogether unfamiliar.

Greatest Known Depth of the Ocean.

The greatest depth which has been ascertained by sounding is five miles and a quarter (25,720 feet, or 4620 fathoms), not quite equal to the height of the highest known mountain. The average depth between 60 degrees north and 60 degrees south is nearly three miles.

Deepest Lake in the World.

In the Cascade Mountains, about seventy-five miles northeast of Jacksonville, Ore., the seeker for the curious will find the Great Sunken Lake, the deepest lake in the world. This lake rivals the famous valley of Sinbad the Sailor. It is said to average 2000 feet down to the water on all its sides. The depth of the water is unknown, and its surface is as smooth and unruffled as a mammoth sheet of glass, it being so far below the mountain rim as to be unaffected by the strongest winds. It is about 15 miles in length and about 4½ wide.

For unknown ages it has lain still, silent and mysterious in the bosom of the great mountain range, like a gigantic trench scooped out by the hands of a giant genie. A hunting and surveying party recently left Jacksonville with the intention of ascertaining the exact depth of this mysterious body of water, and to find out, if possible, whether or not fish are to be found within its ghostly precincts.

The Longest Rivers in the World.

EUROPE.

Name.	Miles.
Volga, Russia	2,500
Danube	1,800
Rhine	840
Vistula	700

ASIA.

Name.	Miles.
Yeneisy and Selenga	3,580
Kiang	3,290
Hoang Ho	3,040
Amoor	2,500
Euphrates	1,900
Ganges	1,850
Tigris	1,160

AFRICA.

Name.	Miles.
Nile	3,240
Niger	2,400
Gambia	1,000

SOUTH AMERICA.

Name.	Miles.
Amazon and Beni	4,000
Platte	2,700
Rio Madeira	2,300
Rio Negro	1,650
Orinoco	1,600
Uruguay	1,100
Magdalena	1,000

NORTH AMERICA.

Name.	Miles.
Mississippi and Missouri	4,300
Mackenzie	2,800
Rio Bravo	2,300
Arkansas	2,070
Red River	1,520
Ohio and Allegheny	1,480
St. Lawrence	1,450

Size of Lakes, Seas and Oceans.

Lakes.	Miles Long.	Miles Wide.
Superior	380	120
Michigan	330	60
Ontario	180	40
Champlain	123	12
Erie	270	50
Huron	250	90
Cayuga	36	4
George	36	3
Baikal	360	35
Great Slave	300	45
Winnipeg	240	40
Athabasca	200	20
Maracaybo	150	60
Great Bear	150	40
Ladoga	125	75
Constance	45	10
Geneva	50	10
Lake of the Woods	70	25

Seas.	Miles Long.
Mediterranean	2,000
Carribbean	1,800
China	1,700
Red	1,400
Japan	1,000
Black	932

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Seas.	Miles Long.
Caspian	640
Baltic	600
Okhotsk	600
White	450
Aral	250

Oceans.	Miles Square.
Pacific	80,000,000
Atlantic	40,000,000
Indian	20,000,000
Southern	10,000,000
Arctic	5,000,000

The Greatest Catastrophes of History.

In China, where some of the greatest rivers in the world flow between artificial banks at an elevation considerably above the surrounding country, there have been overflows that caused the destruction of hundreds of thousands of lives. There have been similar disasters in India, where, as in China, the rivers had made beds for themselves with alluvial banks higher than the plains across which they flowed. But aside from these the colossal calamity at Johnstown, Pa., in June, 1889, and through the fated Conemaugh Valley, leads all disasters in this country in the appalling muster roll of the dead, numbering over 6000. In past centuries the greatest loss of life has been by earthquake, and the following list embraces the loss in historic calamities :

Year.	Place.	Persons Killed.
1137	Sicily	15,000
1158	Syria	20,000
1268	Cilicia	50,000
1456	Naples	40,000
1531	Lisbon	40,000
1626	Naples	70,000
1667	Schamaki	80,000
1692	Jamaica	4,000
1693	Sicily	100,000
1703	Aquila, Italy	4,000
1703	Yeddo, Japan	200,000
1706	The Abruzzi	15,000
1716	Algiers	20,000
1726	Palermo	6,000
1731	Pekin	100,000
1746	Lima and Calloa	18,000
1754	Grand Cairo	40,000
1755	Kashan, Persia	40,000
1759	Syria	20,000
1784	Ezinghian, Asia Minor	5,000
1792	Country between Santa Fé and Panama	40,000
1805	Naples	6,500
1822	Aleppo	20,000
1829	Murcia	5,000
1830	Canton	6,000
1842	CapeHaytien	4,000
1857	Calabria	10,000
1859	Quito	5,000
1860	Mendozi, South America	7,000
1868	Towns in Peru and Ecuador	25,000
1875	San Jose de Cucuta, Colombia	14,000
1881	Scio	4,000
1886	**Charleston**	96

One instance shows how the human race has be depleted from this cause. In the Kingdom Naples, from 1783 to 1857, a period of 75 years, t loss of life by earthquakes was 111,000 or at the ra of more than 1500 a year, out of a population 6,000,000. The country surrounding the Medite ranean and the intertropical area from which th American Cordilleras spring, may be regarded as th centers of earthquake activity, though some of th greatest earthquakes of all time have occurred Eastern Asia and the East Indies.

Floods and Freshets.

The list of losses by great floods and freshets history is as follows :

Year.	Place.	Lives Lost.
1871	China	3,000
1874	Mill River Mass	150
1879	Marcia, Spain	1,000
1887	Yellow River China	100,0
1889	Johnstown, Pa	6,1
1900	Galveston, Texas	5,0

Greatest Conflagrations of the Present Century.

But the greatest destruction of life and propert by conflagrations, of which the world has anythin like accurate records, must be looked for within th current century. Of these the following is a partia list of instances in which the loss of propert amounted to $3,000,000 and upward :

Dates.	Cities.	Propert Destroye
1802	Liverpool	$ 5,000,00
1805	St. Thomas	30,000,00
1812	Moscow, burned five days ; 30,800 houses destroyed	150,000,00
1820	Savannah	4,000,00
1822	Canton, nearly destroyed	
1835	New York ("Great Fire")	15,000,00
1837	St. John, N. B.	5,000,00
1838	Charleston, 1158 buildings	3,000,00
1842	Hamburg, 4219 buildings, 100 lives lost	35,000,00
1845	New York, 35 persons killed	7,000,00
1845	Pittsburgh, 1100 buildings	10,000,00
1845	Quebec, May 28, 1650 dwellings	3,750,00
1846	St. Johns, Newfoundland	5.000,00
1848	Constantinople, 2500 buildings	15,000,00
1848	Albany, N. Y., 600 houses	3,000,00
1849	St. Louis	3,000,00
1851	St. Louis, 2500 buildings	11,000,00
1751	St. Louis, 500 buildings	3,000,00
1851	San Prancisco, May 4 and 5, many lives lost	10,000,000
1851	San Francisco, June	3,000,000
1852	Montreal, 1200 buildings	5,000,000
1862	St. Petersburg	5,000,000

Dates.	Cities.	Property Destroyed.
1862	Troy, N. Y., nearly destroyed	
1865	Constantinople, 2800 buildings burned	
1866	Yokohama, nearly destroyed	
1865	Carlstadt, Sweden, all consumed but Bishop's residence, hospital, and jail; 10 lives lost	
1866	Portland, Me., half the city	$11,000,000
1866	Quebec, 2500 dwellings and 17 churches	
1870	Constantinople, Pera suburb	26,000,000
1871	Chicago, 250 lives lost, 17,430 buildings burned, on 2124 acres	192,000,000
1871	Paris, fired by the Commune	160,000,000
1872	Boston	75,000,000
1877	Pittsburgh, caused by riot	3,260,000
1877	St. Johns, N. B., 1650 dwellings, 18 lives lost	12,500,000
1889	Seattle, Wash	20,000,000

From the above it appears that the greatest fires on record, reckoned by destruction of property, are :

Chicago fire, of Oct. 8 and 9, 1871	$192,000,000
Paris fires, of May, 1871	160,000,000
Moscow fire, of Sept. 14–19, 1812	150,000,000
Boston fire, Nov. 9–10, 1872	75,000,000
Hamburg fire, May 5–7, 1842	35,000,000

Taking into account, with the fires of Paris and Chicago, the great Wisconsin and Michigan forest fires of 1871, in which it is estimated that 1000 human beings perished and property to the amount of over 3,000,000 was consumed, it is plain that in the an- als of conflagrations that year stands forth in gloomy pre-eminence.

Chicago's Great Fires.

There were 2100 acres of land burned over, nearly ll of which area was thickly covered with buildings. here were nearly 18,000 buildings destroyed, of hich about 2400 were stores and factories; and here were but few short of 100,000 people rendered omeless by the calamity. The extreme length of he burnt district was 3¾ miles, and its greatest width little over a mile. The fire of July, 1874, originated n South Clark street, between Taylor and Twelfth, nd spread northeast to Michigan avenue. It was timated that in this fire about fifty acres were urned over, many of the new buildings which had een erected after the great fire of 1871 having been veled.

The loss of property in the great fire of 1871 was 92,000,000, after allowing $4,000,000 for salvage on foundations of buildings. This estimate does not include the shrinkage of real estate values, or the large loss to mercantile interests by the interruption of trade consequent upon the destruction of stocks and business facilities. Mr. Colbert estimated the grand aggregate not very much below $290,000,000.

The loss occasioned by the fire of 1874 was estimated as follows : The net loss to insurance companies was officially placed at $2,244,970, or 40 per cent. of the entire loss, making an estimated total loss of $5,612,425. The cash contributions to Chicago within three months after the fire amounted to $4,200,000.

Most Noted Facts in Turf History.

The richest stake ever run in America was the Futurity stake of 1890, run at Sheephead Bay, L. I., August 30, and won by August Belmont's ch. c. Potomac (2) by St. Blaise, dam Susquehanna, by Leamington. The value of the stake was $77,700, of which $68,450 went to the winner, and $4500 to the second horse, Masher, b. c., by Ill Used also owned by Mr. Belmont, who in addition received $2500 for breeding first and second, making his winnings $75,450. Stathmeath, the third horse, received $2250.

The Lancashire plate run at the Manchester, Eng., September meeting of 1889, and won by the Duke of Portland's b. c. Donovan, was worth nearly $80,000 to the winner.

Largest amount ever won by an American two-year-old, $78,650, Potomac, b. c., by St. Blaise, 1890.

The greatest winning three-year-old was Hanover, by Hindoo. He won twenty races and $89,827.

Miss Woodford, br. m., foaled 1880, by imported Billet, dam Fanny Jane, by Neil Robinson, won more money than any animal that ever ran on the American turf, winning in five years forty-eight races, worth $118,970.

In 1886 the stable of Dwyer Brothers won $208,549.16 in purses and stakes—more money than was ever won by any other single racing establishment in America.

The greatest sale of thoroughbreds ever had in this country was that of P. Lorillard in 1886, at which twenty-seven head sold for $149,050, the highest price being $29,000, the lowest $300.

King Thomas, by King Ban, was the highest priced yearling ever sold at auction, L. O. Appleby paying $38,000 for him at the Haggin sale in New York, June 25, 1888. The following day Mr. Appleby sold the colt to Senator Hearst, of California, for $40,000.

Highest price ever paid for a horse, $105,000, for Axtell, br. s., record, 2.12, three years old, by William L. (son of George Wilkes), dam Lou, by Mambrino Boy. Purchased from C. W. Williams, of Independence, Iowa, by John W. Conley, of Chicago, and others.

Dimensions of Bartholdi's Statue of Liberty.

The figure of this statue, which is made of repousse, or hammered work—that is, thin sheets of copper beaten into shape and fastened about an iron skeleton—is 110½ feet high and weighs 100,000 pounds. The uplifted torch, however, is raised 26 feet, and adding to this the pedestal, the tip of the torch is raised 220 feet from the ground. The pedestal is of stone, 82 feet high. Some idea of the enormous proportions of the statue may be given from the fact that the forefinger is 8 feet long, and 4 feet in circumference at the second joint. The head is 14 feet high and 40 persons can stand in it.

The Dimensions of the Great Wall of China, and of What it is Built.

It runs from a point on the Gulf of Liantung, an arm of the Gulf of Pechili in Northeastern China, westerly to the Yellow River, thence makes a great bend to the south for nearly 100 miles, and then runs to the northwest for several hundred miles to the Desert of Gobi. Its length is 1250 miles. For the most of this distance it runs through a mountainous country, keeping on the ridges, and winding over many of the highest peaks. In some places it is only a formidable rampart, but most of the way it is composed of lofty walls of masonry and concrete, or impacted lime and clay, 25 feet in thickness, and 25 feet in height.

The top of this wall is paved for hundreds of miles, and crowned with crenelated battlements, and towers 30 to 40 feet high. In numerous places the wall climbs such steep declivities that its top ascends from height to height in flights of granite steps. An army could march on the top of the wall for weeks and even months, moving in some places ten men abreast.

Most Northern Point Reached by Arctic Explorers.

The following table shows the furthest points of north latitude reached by Arctic explorers up to and including the Greely expedition:

Year.	Explorers.	North	Latitudes.	
1607	—Hudson	80d	23m	00s
1773	—Phipps (Lord Musgrove)	80d	48m	00s
1806	—Scoresby	81d	12m	42s
1827	—Parry	82d	45m	30s
1874	—Meyer (on land)	82d	09m	00s
1875	—Markham (Nare's expedition)	83d	20m	26s
1876	—Payer	83d	07m	00s
1884	—Lockwood (Greely's party)	83d	24m	00s

The distance from the farthest point of polar discovery to the pole itself is 6 deg. 46 min., or i round numbers, 460 miles. It is 30 miles less tha from Chicago to Omaha, by the lines of the Chicago Milwaukee and St. Paul railway, over which th traveller rides in 24 hours. But this polar radius though only 460 miles in extent, is covered by ic gorges and precipices of incredible difficulty; an frost is so severe that no instrument of human invention can measure its intensity, and it blisters th skin like extreme heat.

The greatest progress that has ever been mad across these wildernesses of storm, of fury and desolation, was at the rate of five or six miles in a da the explorers often necessarily resting as many da as they had before travelled miles in a single da debarred by the obstacles that they had encountere

The Coal Area of the World.

The coal area of the world is distributed as follows

	Sq. Miles.		Sq. Mile
United States	192,000	Germany	1,8
British America	18,000	Belgium	5
Great Britain	12,000	Rest of Europe	100,0
Spain	4,000	China	2,0
France	2,000	Japan	5,0

Railroad Facts.

The cost of railroads in the United States has bee $9,000,000,000.

One million persons are employed by the railroa of the United States.

The cost of a high-class eight-wheel passenger l comotive is about $8500.

The cost of a palace sleeping-car is $15,000, or "vestibuled," $17,000.

The average cost of constructing a mile of railro in the United States at the present time is ab $30,000.

The average daily earning of an American locom tive is about $100.

The "consolidation" locomotive weighs about tons, and is able to draw on a level over 2400 tons.

The longest mileage operated by a single syste is that of the Atchison, Topeka and Santa Fe—ab 8000 miles.

The line of railroad which extends farthest e and west is the Canadian Pacific, running fr Quebec to the Pacific Ocean.

There are 60 miles of snow-sheds on the Cent Pacific Railroad.

The highest railroad in the United States is t Denver and Rio Grande at Marshall Pass—10,8 feet.

THE BARTHOLDI STATUE OF LIBERTY

The longest American railroad tunnel is the Hoosac Tunnel on the Fitchburg Railroad—4½ miles. (The St. Gothard Tunnel in Europe is over 9 miles in length.)

There are 208,749 railroad bridges in the United States, spanning 3213 miles.

The longest railroad span in the United States is the Cantilever span in the Poughkeepsie bridge over the Hudson River—548 feet.

The highest railroad bridge in the United States is the Kinzua Viaduct on the Erie road—305 feet high.

The Manhattan Elevated Railroad of New York carries the largest number of passengers of any American road, over 200,000,000.

A steel rail lasts, with average wear, about eighteen years.

The Fastest Locomotive Ever Built.

The largest and fastest passenger engine ever built, was by the Rhode Island Locomotive Works, for the New York, Providence and Boston Railroad Company. The main driving wheels are six feet in diameter, and set but seven feet six inches apart. This arrangement makes her run easily on curves. The cylinders are eighteen inches in diameter, with twenty-four-inch stroke. The boiler is fifty-four inches in diameter at the smoke-stack, with a wagon top. It extends to the very end of the cab, and necessitates the elevation of the engineer's seat to a height far above the fire door. The fire requires three tons of coal before the engine pulls out of the round-house to make her trips, and four tons will be carried on the tender. The tank of the latter will hold 4000 gallons of water, and the total weight of the engine proper is 93,000 to 95,000 pounds.

She looks to be enormously high as she sets up well in the air, and her short smoke-stack adds to her apparent height. Everything about her is steel. There is not a particle of brass or bright work about her. She makes the run from Providence to Groton, Conn., a distance of 62.5 miles, including a dead stop at Mystic drawbridge, as required by the statutes of Connecticut, in just 62.5 minutes, pulling at the same time eight cars, four of which are Pullman's.

One Railroad in Palestine.

There is but one railway within the province of the Jerusalem consulate. This connects Jerusalem with the seaport, Jaffa, and it is 53 miles long. Its simple Oriental name is Chemin de Fer Ottoman de Jaffa a Jerusalem. It is a French corporation, but is practically controlled by the Turkish government.

The line is in fair condition, but the accommodations for passengers are very bad, and would not be tolerated by the traveling public of Europe or the United States. It is difficult to keep the line in good condition, owing to the heavy grades and short curves among the mountains. In the distance of 53 miles the ascent is nearly 2500 feet, most of which is made during the last half of the distance. The road is single track and narrow gauge. The daily service consists of one passenger and one freight train each way. The first-class fare between the termini is $3, and a round-trip ticket is sold for $4.

There are numerous railway lines in South Africa, the railroad-building industry having in recent years assumed very extensive proportions. Owing to the soft nature of the soil and the frequency of the rains, most of the roadbeds are in a state of chronic instability. There is regular railway communication between Pretoria and Cape Town, a distance of 1040 miles. The first-class passenger fare is 6 cents a mile.

The Great Siberian Railway—a through line across Siberia 4715 miles long—is now under construction in three sections. This is one of the biggest railway engineering enterprises ever undertaken, involving, as it does, the tunneling of great mountains and the building of enormous viaducts and bridges. The Cheliabinsk-Omsk line is fast nearing completion. The Middle Siberian section, the construction of which was begun in 1893, is now well under way, and it is hoped that it will be finished very soon. The main trunk of the great line is under contract to be completed not later than 1900.

To Sweden is given the distinction of owning more railway mileage per capita than any other country in Europe, and a Swedish road enjoys the further distinction of being the only railway in the world that enters the polar circle.

The Seven Wonders of the World.

The "pyramids" first, which in Egypt were laid;
Next "Babylon's garden," for Amytis made;
Then "Mausolo's tomb" of affection and guilt;
Fourth, the "temple of Dian," in Ephesus built;
The "colossus of Rhodes," cast in brass, to the sun;
Sixth, "Jupiter's statue," by Phidias done;
The "pharos of Egypt" comes last, we are told,
Or the "palace of Cyrus," cemented with gold.

The Wonders of the New World.

The group of natural objects that have been classed as the seven wonders of the new world are, Niagara Falls, Yellowstone Park, the Mammoth Cave, the Canyons and Garden of Gods, Colorado; the Giant Trees, California; the Natural Bridge, Virginia, and the Yosemite Valley.

DATES
OF
FIRST OCCURRENCES

Affirmation of the Quakers first accepted as an oath, 1702.

Air-guns invented 1646; for throwing shells, 1886.

Amphitheatre in Rome built A. D. 69.

Amphyctionic Council or General Assembly of Greece established B. C. 1497. This is the first instance on record of a free representation of independent states meeting to deliberate and settle their concerns by force of reason in place of arms.

Arithmetic by the Arabian figures introduced into Europe by the Saracens of Spain in the ninth century of the Christian era.

Assassination of Lincoln, April 14, 1865.

Baffin's Bay, separating Greenland from North America, discovered by Captain Baffin in 1662.

Balloons said to have been invented by Gusmac, a Jesuit, 1729, but probably invented much earlier, and first used in France by Montgolfier in 1782.

Banks in the United States commenced in the early part of the Revolutionary War. The first by a number of gentlemen in Philadelphia, June 17, 1780, with a capital of $839,160; instituted for the purpose of supplying the American army with provisions.

Barometers invented by Forricelli, 1643.

Bayonets invented at Bayonne, in France, 1670.

Blood, circulation of, through the lungs, first made public by Michael Servetus, a French physician, in 1553.

Books in the present form were invented by Attalus, King of Bergumus, 887; the first supposed to be written in Job's time.

Bread first made with yeast by the English, 1650.

Bricks first used in England by the Romans—the size ordered by Charles I., 1625.

Burning glass and common mirrors date back to 1680.

Cable, first Atlantic, operated 1858.

Canals are of very ancient date, the first of which we have any record being that in Egypt between the Nile and Red Sea.

Cards invented in France; first used for amusement by Charles VI., 1380.

Carriages first introduced into Vienna 1515, into London 1580.

Chess, the game of, invented B. C. 608.

China, first voyage to, from the United States, 1784.

China, porcelain, first spoken of in history 1591.

Chloroform was discovered in America and Germany, 1831. In 1847 it was brought into prominent notice as an anæsthetic by Sir James Simpson, of Edinburgh.

College, Harvard is the oldest in the United States, established 1638.

Cotton first raised in Virginia 1621, first exported 1741.

Christmas day first observed as a festival, 98.

Circumnavigators of the globe; the first was Magellan, or rather by his fleet, as he was himself slain on the voyage, 1522.

Clocks made to strike by Arabians, 800; by Italians, 1200.

Cloth, coarse woolen, first made at Kendal, 1390.

Coal discovered near New Castle, England, 1234.

Coin, silver, coined in China, 1200 B. C.; in Rome, 576; in England, 1101.

Colleges as places of public instruction, in which academical degrees were granted, first established at Paris, 1215.

Commerce first mentioned in the book of Genesis, when Joseph's brethren sold him to a caravan of Ishmaelites.

Compass in use in Europe as early as 1180; variation first observed by Columbus and his companions, 1492; used in China, 2634 B. C.

Congress, Continental, first met in Philadelphia, September 5, 1774.

Copper mines found in New York, 1722.

Councils. The first Nicene, when 328 fathers attended against Arius, 325; at Nice, when Pope Adrian presided and 350 fathers attended, 787.

Christianity was propagated in Spain in 36; in Britain, 60; or, as others say, in the 5th century; in Franconia and Flanders, in the 7th century; in Lombardy, Thuringia and Hesse, in the 8th century; in Sweden, Denmark, Poland and Russia, in the 9th century; in Hungary and Sclavonia, in the 10th century; in Vandalia and Prussia, in the 11th century; in Pomerania and Norway, in the 12th century; in Livonia, Lithuania and part of Tartary, in the 13th century; in Sclavonia, part of Turkey, and the Canary Isles, in the 14th century; in Africa, at Guinea, Angola, and Congo, in the 15th century; made great progress in Prussia, both the Indies and in China, by the Protestant faith, in the 16th century; reinstated in Greece, &c., &c., in the 17th century.

Delft earthenware first made at Faenza, 1450.

Distillation of spirituous liquors began in the 12th century; in Ireland, 1590.

Electricity, first idea of, given by two globes of brimstone, 1467; electric spark discovered at Leyden, 1746; first known it would fire spirits, 1756.

Emancipation Proclamation, by President Lincoln, January 1, 1863.

Engraving on metal plates known in Europe, B. C. 504; on wood, invented in Flanders, 1423; on steel, became common about 1830; lithographic, invented by Senefelder, a German, about 1796.

Envelopes were first used in 1839.

Etching on copper, with aqua fortis, invented -512.

Fire engine, to force water, invented 1663.

Flag, American, first used at Cambridge, Mass., by Washington, January 1, 1776. Legally established by Congress, June 14, 1777.

Gas, use of, introduced into London for lighting shops and streets, 1814; first into the United States, at Baltimore, 1821.

Gilding with leaf gold invented by Margaritone, 1273.

Gypsies quitted Egypt, when attacked by the Turks, in 1515, and wandered over all Europe.

Glass, the art of making it, known to the Romans before 79; Egypt, 1740 B. C.; the Chinese about 200; introduced into England by Benedict, a monk, 674; glass windows began to be used in private houses in England, 1180; glass first made in England into bottles and vessels, 1757; the first plate glass for looking glasses and coach windows, made at Lambeth, 1673; in Lancashire, 1773; window glass first made in England, 1557.

Gold was first discovered in California, in 1848.

Grist mills invented in Ireland, 214.

Gunpowder credited to Chinese; rediscovered, 1324.

Habeas Corpus Act in England passed, 1641; attempt made in the Senate of the United States to suspend it, but rejected by the House of Representatives, 1806.

Hackney coaches first used, 20 in number, in London, 1625.

Hair powder in use in England, 1590; a guinea per year tax on those who wear it, 1795.

Handkerchiefs first manufactured at Paisley in Scotland, 1748, when $80,000 worth were made.

Hats invented at Paris, 1404; first made in London, 1510.

Heraldry had its rise about the year 1100.

Hour glasses were invented in Alexandria, 240, and introduced at Rome 158 years B. C.

Hudson's Bay discovered by Captain Hudson, 1607.

Indigo first produced in Carolina, 1747.

Infallibility. The dogma of Pagal Infallibility promulgated in 1870.

Inoculation first tried on criminals, 1741; vacine discovered by Dr. Jenner, 1799.

Insurance on shipping began in England, 1560.

Iron discovered by the burning of Mt. Ida 1406 B. C.; first cast in England, at Backstead, Sussex, 1544; first discovered in America in Virginia, 1715.

Iron steamship, the first was built in 1830.

Jupiter's satellites discovered by Jansen, 1590.

Juries first instituted by Ethelred II., King of England, 979; the plaintiff and defendant, in those times, used to feed them; whence the common law of denying sustenance to the jury after hearing evidence.

Kerosene first used for illuminating in 1826.

Kingdom, origin of, by Nimrod at Babylon, 2233 years B. C.

King's evil supposed to be cured by the touch of the Kings of England, the first king being Edward the Confessor, 1058. It was dropped by George I.

Kissing the Pope's foot first practiced, 709.

Knitting stockings invented in Spain about 1550.

Knives first made in England, 1550.

Lamp for preventing explosion by fire-damp in coal mines, invented by Sir Humphrey Davy, 1815.

Lancastrian schools of education established in most of the principal towns of England, 1810.

LAWNS AND THREAD GAUZE were manufactured at Paisley in 1784.

LETTERS invented by Memnon, the Egyptian, 1822 B. C.

LIBERTY BELL, the most famous bell in America, relic most prized by the nation, hung in the tower of Independence Hall, Philadelphia, 1776, and was rung when the Declaration of Independence was adopted. It was cracked while tolling for the death of Chief Justice Marshall, 1835, and has never been put to public use since. It was exhibited at the World's Fair, Chicago, 1893, and at the Atlanta Exposition, 1895.

LINEN first made in England, 1253; the rich people wore linen, the poorer woolen shirts.

LOCOMOTIVE, the first use of one in this country was in 1820.

LOCUSTS, the country of Palestine infected with such swarms of, that they darkened the air, and after devouring the fruits of the earth, they died, and their intolerable stench caused a pestilential fever, 406. A similiar circumstance occurred in France, 873; a large swarm of, flew over the city of Warsaw, June 17, 1816; swarms of, made their appearance near Aschersleben, June 24, 1816.

LOOKING-GLASSES made only at Venice, 1300.

LOOMS, the power loom invented by the Rev. Mr. Cartright, a clergyman of Kent, England, 1787.

LOTTERIES, the first mentioned by historians for sums of money, 1630.

MAGNIFYING-GLASSES first made in England by Roger Bacon, 1260.

MAMMOTH, first fairly complete one discovered near the mouth of the Lena, in Siberia, 1806.

MAPS AND GLOBES invented by Anaximander, 600 B. C.

MARBLE PAPER, a German invention belonging to the 17th century.

MATCHES, friction, first used in 1829.

MECKLENBURG Declaration of Independence issued May 31, 1776.

MICROSCOPES first used in Germany, 1621; the double ones, 1624; solar microscopes invented, 1740.

MILITARY ACADEMY, West Point, founded by Congress, March 16, 1802.

MISSOURI COMPROMISE passed March 3, 1820, and appealed May 24, 1854. It restricted slavery to south of 36° 30′.

MONASTERY, the first founded where the sister of St. Anthony retired, 270; the first founded in France, near Poictiers, by St. Martin, 360; Constantine IV. sends for a great number of friars and nuns to Ephesus, orders them to change their black habits for white and to destroy their images; on their refusal he orders their eyes to be put out, banishes them, and sells several monasteries, appropriating the produce, 770; they were totally suppressed by Act of Parliament in 1539.

MONEY, first mentioned as a medium of commerce in the twenty-third chapter of Genesis, when Abraham purchased a field as a sepulchre for Sarah, in the year of the world 2139; first made at Argos, 894 B. C.; has increased eighteen times its value from 1290 to 1640; and twelve times its value from 1530 to 1800.

MONROE DOCTRINE declared in the message of President Monroe, December 2, 1823. Re-asserted by President Cleveland in a message to Congress concerning the boundary line dispute between Venezuela and Great Britain, December, 1895.

MORMONS, sect of, founded by Joseph Smith, 1830; removed from Nauvoo to Salt Lake Valley, Utah, July 24, 1847.

MUSICAL NOTES invented in 1070; improved, 1330; printed, 1502.

NANTES, Edict of, tolerating Protestants, 1598; revocation, 1685.

NEEDLES first made in England by a native of India in 1545.

NEW ORLEANS, battle of, January 8, 1815, Jackson defeating the British. Captured by Farragut, April 26, 1862.

NEWSPAPER, the first authentic copy was printed in 1494; first daily, *Frankfort Gazette*, 1615. The first English was the *Weekly Newes*, 1622; the first in France, *Gazette de France*, 1631. The first advertisement appeared in 1648. The first American newspaper was printed in Boston, September 25, 1690, and was called *Publick Occurrences, Foreign and Domestic.* The first continuously printed in America was the *Boston News Letter*, 1702; first daily, *The Pennsylvania Packet*, 1784.

NULLIFICATION ORDINANCE passed by South Carolina, November 19, 1832. The proclamation of President Jackson denouncing the same was issued December 10, 1832.

ORGANS were invented in 755.

OXFORD UNIVERSITY, England, founded by Alfred, 886.

PAINTING, earliest account of, in the reign of Ninus, about 2000 B. C.

PAPER CURRENCY established in America May 15, 1775. Paper money first used in America, 1740.

PAPER made from silk, China, 120 B. C.; from rags, Egypt, 1085.

PARCHMENT invented by King Attalus of Pergamus, 887 B. C.

PATENT RIGHT LAW first enacted in United States, April 15, 1790.

PAVING with stones first introduced, in Paris, 1186.

PEARLS, artificial, were invented 1686.

PENS for writing were first made from quills in 635. The substitution of steel for quill pens took place early in the present century, yet strange to say, nothing is known with certainty of the person who first invented the metallic pen. Fountain pens and glass pens are of recent date.

PENNYPOST set up in London and suburbs, by one Murray, an upholsterer, 1681, who afterwards assigned the same to one Dockwra; afterwards claimed by the government, who allowed the latter a pension of £200 a year, in 1711; first set up in Dublin, 1774; it was improved considerably in and round London, July, 1794; made a two-penny post in 1801.

PHILADELPHIA was founded by William Penn in 1682. Riots, native American and Irish, May 6 to 8, 1844. First National Convention of the Republican Party, 1856.

PHONOGRAPH invented in 1877 by Thomas A. Edison.

PHOSPHOROUS first made in 1677.

PHOTOGRAPHS were first produced in England in 1802; perfected in 1841.

PIANOFORTE invented about 1710 in Italy.

PINS were brought from France, and first used in England by Catherine Howard, Queen of Henry VIII. Before that time both sexes used ribbons, loop-holes, laces with points and tags, hooks and eyes, and small skewers made of gold, silver and brass. Pins were first made by machinery in America in 1832.

PIPES OF LEAD, for water, first cast in 1539.

PISTOLS first used by the cavalry in 1544.

PITCH and tar first made from pit coal at Bristol, in 1779.

PLASTER OF PARIS. Casting with it from the face invented in 1470.

PORCELAIN of Saxony greatly improved in 1767.

PORT-HOLES introduced for ships of war in 1545.

POST-OFFICE first established between Vienna and Brussels in 1516. Posts established regularly between London and all the principal towns throughout England in 1635. Postage stamps were introduced in England in 1840; in the United States in 1847.

POTTERY improved greatly by Wedgwood in 1763.

PRINCE OF WALES, the title of, first given to the king's eldest son, 1286.

PRINTING. The Assyrians and Babylonians used clay tablets, and wooden blocks were used by the Chinese as early as 952. Printing from movable types was invented by Faust in 1441, and made public by Gutenberg in 1454, although the invention is also claimed for L. Koster, of Haarlem, as early as 1423. The first Bible was printed by Faust and Schoffer, in 1456, and they also printed the first book with date, a Latin Psalter, 1457. Wooden type first introduced into England, by William Caxton, a London merchant, in 1477. The first English press was set up in Westminister Abbey, where it remained until 1494. The first American book, "Escala Espiritual," was printed by Juan Hablas, Mexico, about 1535. The first press in the United States was that of Stephen Daye, at Cambridge, Mass., 1639. Printing in colors was first introduced in 1626.

PYRAMIDS first erected about 2170 B. C.

QUICKSILVER first used for refining silver ore, in 1540.

RAILROAD. The first passenger railroad was opened in England, September 27, 1825; the first in America, Baltimore and Ohio, 1828, although freight was moved by rail at the granite quarries, of Quincy, Mass., as early as 1826. The first steam railroad was operated in the United States in 1830, from Albany to Schenectady—16 miles.

REFORMATION in Germany, 1517; in England, 1532.

REPUBLICAN PARTY. The first convention was held at Pittsburgh, February 22, 1856.

RESUMPTION of Specie Payments in the United States—Act approved 1875; took effect January 1, 1879.

RIBBON LOOMS. It has been asserted that these looms were first known to the Swiss, but others claim their invention for a German in the town of Dantzic in the 16th century.

RULING-MACHINES invented by a Dutchman in London in 1792.

SADDLES. Pliny informs us that one, Pelethronius, was the first to introduce a piece of leather fastened to the back of a horse for the accommodation of its rider. For a long time these cloths and pieces of leather were regarded as unmanly, and were, therefore, regarded by soldiers with great scorn. The old German races despised the Roman cavalry for riding on such effeminate contrivances. Saddles of the kind now used appear to have been in use in 385. Side-saddles first used in 1380. Previous to their introduction women always rode astride.

SAILCLOTH first made in England in 1590.

SALTING HERRINGS after the Dutch method first used in 1416.

SALTPETER first manufactured in England, in 1625.

SAWS. The inventor of the saw is said, by the old Greek writers, to be Talus or Perdox. Pliny ascribes the invention to Dœdalus, but Hardouin affirms that the passage in which he does so refers to Talus, and not to Dœdalus. Talus was the son of a sister of Dœdalus, and the invention is said to be due to his using the jawbone of a snake to cut through a piece of wood. His master grew jealous of the honor Talus won by this invention, and caused him to be privately put to death.

SCHOOLS, public or common, first known in America, were established in the New England States about 1642.

SEDAN CHAIRS introduced into England in 1734.

SEWING-MACHINE first patented in England, in 1755. The first complete machine was constructed by an American, Elias Howe, in 1846.

SEXTANT invented by Tycho Brahe, at Augsburg, in 1550.

SHAY'S REBELLION, in Massachusetts, 1786–87.

SLEEPING-CARS were first used in 1858. Pullman's patent dates from 1864.

SOAP first made in London and Bristol in 1524. The first express mention of soap appears in Pliny and Galen. The former speaks of it as an invention of the Gauls.

SPEAKING-TRUMPETS invented by Kircher, a Jesuit, in 1652.

SPINNING-WHEEL invented at Brunswick, 1530.

SPECTACLES invented by Spina, a monk, of Pisa, in 1299.

STAMP ACT enacted March 22, 1765; repealed March 19, 1766.

STATUTES of the United States first revised and codified in 1873.

STEAM. The steam engine boiler was discovered by the Marquis of Worcester in 1663. Newcommen's engine was patented in 1705, and the invention was perfected by James Watt in 1773. The high pressure engine was invented by an American, Oliver Evans in 1779. The first steam vessel of which there is any record was that of Papin (France), in 1707. Then follow those of Jonathan Hulls (England), 1736; William Henry (Conestoga River, Pa.), 1763; James Rumsey (Md.), 1786; John Fitch (Delaware River), same year. In 1806 Robert Fulton constructed the Clermont, which plied regularly between New York and Albany, at a speed of five miles per hour. The first steamer crossing the Atlantic made the voyage from Savannah to Liverpool in twenty-five days, A. D. 1819.

STEEL. The invention of steel is of very great antiquity and the process of hardening iron is described in the Old Testament (Isaiah xliv, 12). The helmet of Hercules, described in Hesiod, appears to have been of steel. Homer refers to the process of hardening steel by immersing it, while red hot, in cold water.

STEREOTYPE PRINTING invented by William Gid, a goldsmith, of Edinburgh, in 1735.

STIRRUPS, according to a statement made by the Emperor Mauritius, were first used in the 6th century. Hippocrates and Galen speak of a disease which, in their time, was occasioned by long and frequent riding, because the legs hung down without any support.

SUGAR is first mentioned in 625 by Paul Eginetta, a physician. It came originally from China and the East; was produced in Sicily in 1148, in Maderia in 1419, in the Canary Islands in 1503, and in the West Indies by the Portuguese and Spaniards in 1510. In 1641 it was cultivated at Barbadoes. Sugar-refining was first carried out by a Venetian in 1503, and this process was adopted in England in 1569. Sugar cane was first cultivated in the United States in 1751, near New Orleans, the first sugar mill being constructed in 1858.

SUNDAY-SCHOOLS were first established by Robert Raikes, Gloucester, England in 1781.

SUN-DIALS invented 558 B. C. The first in Rome, 308 B. C., was that erected by Papirius Cursor, when time was divided into hours.

TANNING LEATHER. A new and more expeditious method than that previously in use was invented in 1795.

TAX. The first tax levied on the people was by Solon, 540 B. C.

TEA first known in Europe in 1610, being brought from India by the Dutch.

TELEGRAPHS (mechanical) invented in 1687. First used by the French in 1794, and by the English in 1796. The first electric telegraph was operated from Paddington to Drayton, England, in 1835, the same year in which Morse's telegraph was invented. The first telegraph line in operation in America was between Baltimore and Washington in 1844. The first submarine cable was laid in 1851, between Dover and Calais, and the first Atlantic cable was operated in 1858.

Telephone. A. Graham Bell first presented a speaking telephone at the Centennial Exposition, Philadelphia, in 1876.

Telescopes. The first reflecting telescope made on the principle discovered by Sir Isaac Newton in 1692.

Temperance society, the first in this country was organized in Saratoga County, N. Y., in March, 1808.

Thread first made at Paisley, Scotland, in 1722.

Thermometers first invented by Drebel, a Dutchman, in 1620; improved by Reaumur in 1730, and by Fahrenheit in 1749.

Tobacco was first introduced into England, from Virginia, in 1583.

Union of England and Scotland, 1707; Great Britain and Ireland, 1801.

Vaccination. See *Inoculation.*

Ventilators first introduced by the Rev. Dr. Hales in 1740.

Violins of the modern kind invented about 1477. Introduced into England by Charles II.

Wall-papers first used in Spain and Holland in 1555. Flock or velvet wall-papers were first used in 1620.

War ships. In 1814 Sir Robert Seppings introduced various most important improvements for the construction of war ships. The lower parts of the frames of ships of war were then, for the first time, filled in, a system of diagonal trussing was introduced, the stern was altered in form, so that it no longer remained open to the fire of an enemy, and the upper decks were enlarged. Sir W. Symonds altered them so as to decrease the quantity of ballast required in 1832. In the International Exhibition of 1851 various improvements in this direction were shown, but great iron-cased ships were not then thought of. In July, 1854, the first of a new class of screw, gun vessels was launched for use during the Russian war. To operate with these, vessels of iron were constructed to bombard the fortresses in the Baltic. The first French iron-cased ship was a frigate called the "Cloire," and this was quickly followed by the first English ship of that kind, the "Warrior." Since then vessels of this kind have been subject to a variety of alterations and experiments tending to improve both their strength and their sailing qualities. The first battle between iron ships of war occurred in the war for the Union, the Merrimac and Monitor being the contestants.

Watches were invented at Nuremberg in 1477, and were first introduced into England from Germany in 1577.

Water mills for grinding corn are said to have been invented by Belisarius when Rome was besieged by the Goths in 555. Pliny, however, mentions wheels turned by water.

Weather-cocks. The earliest mention of a weather-cock is that made by Vitruvius, concerning that on the tower built at Athens by Andronicus Cyrrhestes.

Wild-fire invented by a Greek in 663.

Wilmot Proviso, to restrict slavery, offered in the House of Representatives, August 8, 1846, by David Wilmot, of Pennsylvania.

Wire invented at Nuremberg in 1351.

Wire-drawing. The first record we have of this art is probably that contained in Holy Writ, where we are told that gold was beaten and cut to threads, so that it could be interwoven in cloth. The present mode of forming metallic threads, that known as wire-drawing, was first known in the 14th century.

Woolen cloth. Although the making of woolen cloth is one of the most ancient arts, its manufacture was not known in France until 1646, when it was made at Sedan. It was first made in England in 1331, but was not dyed or dressed until 1667.

Yellowstone National Park established by Act of Congress, February 28, 1871.

THE COUNTRIES

OF THE

WORLD

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THE UNITED STATES

AMERICA, including a vast extent of territory, embracing every variety of climate, and bearing within it, besides its precious ore and gems, the germs of immense wealth, remained undiscovered until the 11th of October, 1492, when Christopher Columbus, a native of Genoa, who had sailed from Spain with three small vessels under the patronage of Ferdinand and Isabella, the Castilian monarch, first beheld a light on the shore of the new continent, two hours before midnight. On the next day he set foot in the New World.

The Christian adventurers did not fail to kneel upon the sand and offer up their thanks for having been preserved through the perils of a long voyage. This island was called Guanahani, by the natives, a name which Columbus altered to St. Salvador, and was one of the Bahama Islands.

It is worthy of remark that the vast continent which Columbus discovered was not called by his name, but derived its appellation from Amerigo Vespucci, a Florentine navigator, who made some subsequent discoveries, in company with Alonzo de Ojeda, in 1499. Columbus did not rest satisfied with his first successful voyage or the fame which he acquired by it, but he undertook others. He was, however, in the end, the victim of jealousy and ingratitude. The Spanish colonists at Hispaniola became discontented and preferred complaints against him, sending home accusations and remonstrances by every ship that sailed to Spain.

The Discoverer in Irons.

In consequence of this, Don Francisco de Bobadilla was sent out by the court, and invested temporarily with the chief power, being permitted to use his own judgment in quelling the disturbances of the colonies. This person scrupled not to arrest Columbus and put him in irons, from which he would not suffer himself to be freed, when he was sent to Spain.

"No," said he, when the attendants offered to remove them; "the truth must be apparent, and my patrons are too noble, too generous to overlook me. Then, if fortune again smiles upon me, these will serve as affecting memorials of sorrow past; I will not part with them, and I even wish that, when I am no more, they may be suspended over my sepulchre." When he again set foot in Spain, he might have exclaimed, in the language of the poet:

"Are these the wreaths of triumph you bestow
On those who bring you conquest home and honor?"

Columbus was liberated immediately by royal order, and received at court with great respect. But though Bobadilla was recalled, Columbus in vain supplicated to be restored to his government; he was put off by vague promises, and the post finally given to Don Nicholas Ovando, a practical as well as accomplished man. Thus after three momentous voyages, and the acquisition of much fame, he found himself displaced and thwarted in a point in which he conceived his honor concerned, and his hard-earned authority torn from his possession.

But it was not the nature of Columbus to sink under his misfortunes; on the contrary with four small caravels, the largest being but of seventy tons burthen, he set out on his fourth voyage of discovery with the intention of completing the circumnavigation of the globe, visiting the Indies, of which Vasco da Gama had given so inspiriting an account.

A Singular Occurrence.

Leaving Cadiz on May 9, 1502, he reached Martinique, one of the Windward Islands, June 15. Having touched at Cuba, he pursued a southwesterly course, until he reached Guanaja, an island on the coast of Honduras, whose inhabitants had attained a pretty high degree of civilization. Their persons were covered with cotton garments dyed with a variety of bright and pleasing colors.

He mentions a curious occurrence as taking place here. He had been presented, among other animals, with a peccary, or American pig, and one of those monkeys with prehensile tails, indigenous to America. The peccary being thrown in the way of the monkey, the latter, by a dexterous use of its tail, confined the jaws of the pig in such a manner as to expose it helplessly to the action of the monkey's claws. "This appeared to me so strange," Columbus writes to his patrons, "that I thought fit to write it down for the information of your majesties."

The Spaniards entertained the most exaggerated ideas of the wonders of the New World. To most of them, it appeared a realm of magic, a fairyland, in which supernatural occurrences were by no means infrequent. Thus Juan Ponce de Leon, in 1512 fitted out three ships from Porto Rico, of which he was governor and set forth in search of an Indian fountain which was fabled to restore all who bathed in it, even if they were tormented by the infirmities of extreme old age, to the freshness, vigor and beauty of youth. Although he failed to find the fountain, he made the discovery of Florida.

Extinction of the Red Men.

From the time of the first European settlements in this part of America, the number of the Indians has diminished rapidly, and they are now reduced to a mere handful, whom the wave of emigration is fast rolling to the shores of the Western Ocean. They have seen their hunting grounds diminished, their forests swept away by their white foes, and the smoke of the Christian village rising where once their council-fires blazed.

The discovery of America awakened the enterprise of various nations of the Old World, and they fitted out numerous expeditions to conquer and colonize. North America, which is of vast extent, its surface containing about eight millions of square miles, fell into the hands of the English, French and Spanish. Mexico, so valuable for its mines of gold and silver, inhabited at the period of its discovery by intelligent and peaceable nations, was conquered by Fernando Cortez, a Spanish general, who scrupled not to make use of the basest treachery, and to shed the blood of the natives like water, to accomplish his purposes. Mexico was for a long time attached to Spain, to which it furnished immense wealth, but at present has a republican government which it can hardly be said to enjoy, the country is in such an unsettled state.

The eastern shores of North America, were settled principally by the English. In spite of the hostility of the Indians, the ravages of disease and hardship, the colonies increased rapidly. The population of the middle portion of North America, now called the United States, was estimated, in 1775 at about 3,000,000. The number of the colonies was thirteen. Poverty and oppression had first driven them from their native land.

Settlement of the Colonies.

The following dates of the settlement of the colonies, are given for reference:

Virginia, 1607.

New York, by the Dutch, 1614; occupied by the English, 1664.

Plymouth, 1620; incorporated with Massachusetts in 1692.

Massachusetts, 1628.

New Hampshire, 1623.

New Jersey, by the Dutch, 1624; occupied by the English in 1664.

Delaware, by the Dutch, 1627; occupied by the English in 1664.

Maine, 1630; united with Massachusetts in 1677.

Maryland, 1633.

Connecticut, 1635.

New Haven, 1637; united with Connecticut in 1662.

Providence, 1635; } united 1644.
Rhode Island, 1638; }

North Carolina, 1650.

South Carolina, 1670.

Pennsylvania, 1682.

Georgia, 1733.

The English settlers in the northern parts of America, were influenced by different motives from those which actuated the Spaniards who quitted their native country for the shores of the New World. The latter were urged onward by a reckless spirit of adventure, by the promptings of heated imaginations, and by the most insatiable cupidity. The former were impelled by far worthier motives. Many causes operated together in the mother country, to favor emigration among the resolute and hardy.

The people of England had been led to examine the nature of the power to which they were subjected, and the monstrous doctrines of prerogative and religious intolerance, were denounced by many who had courage to think and speak for themselves upon the subjects. The friends of republican institutions multiplied with great rapidity, the natural result of the progress of literature, and the increase of wealth with the commons. In 1628 the wealth of the House of Commons far exceeded that of the House of Lords.

The English Puritans.

At the same time, the reformation which had been carried into effect by Henry VIII, while it had purged the country of many abuses long complained of, had established a form of worship which was regarded by many as little better than that which had given way before it. Those who refused to conform to the established form, contemptuously termed *Puritans* by their opponents, and anxiously sought scope for the exercise of religious rights, and, since the immunities they demanded were not granted them at home, determined to seek refuge from persecution in a remote quarter of the globe.

King James granted, in 1606, letters patent to two companies, called the London and Plymouth Companies, by which possession

Y THE PILGRIMS AT PLYMOUTH.

was given them of the territories lying between the 34th and 45th degrees of north latitude; the southern part to the London, and the northern part to the Plymouth Company: the king himself having undertaken to frame for them a code of laws.

Three ships were provided by the London Company, on board of which were 105 persons, who were expected to remain at Roanoke, which was the place of their destination. They made a settlement on a peninsula and called it Jamestown. This was the first permanent settlement made by the English in Virginia.

Story of Captain Smith.

Shortly after, the company received supplies from England, and an accession to their numbers, swelling the number to 200. Two vessels were freighted for England; one loaded with a yellow and brilliant sand, common in many places in the vicinity, but supposed by the colonists to contain a large proportion of gold; the other vessel was loaded with tobacco. The most efficient member of the council was Captain Smith, who was taken by the Indians while on an exploring expedition.

He was led to the place of execution, and his head placed upon a stone, while Powhatan, the Indian chieftain, stood over him with uplifted club, regardless of the earnest solicitations of his daughter Pocahontas, then about 13 years of age. The princess, finding her entreaties unavailing, fell upon Smith, folded him in her arms, and laid her face upon his, determined to meet death with him she could not save. Moved by this touching devotion, Powhatan relented, and, two days afterwards, sent Smith to Jamestown.

In 1609, the destruction of the whole colony was planned by the Indians, but their plans were defeated by the exertion of the princess Pocahontas, who, in a dar night, went to Jamestown, and put the president upon his guard. Pocahontas marrie an English gentleman by the name of Rolfe embraced the Christian religion, and wa baptized by the name of Rebecca. Sh died four years after at Gravesend, on he return with her husband from England. I 1619, twenty negroes were brought to Virginia in a Dutch vessel, and sold to the colonists, whence one may date the commencement of the slaveholding system.

In 1614 Captain Smith was sent fron England to explore North Virginia. H ranged the coast from Penobscot to Cap Cod, making observations on the shores harbors, islands and headlands; and made map of the country, which on his return t England, he showed to Prince Charles (afterwards Charles I), who gave it the name o New England.

Arrival of the Pilgrims.

The Rev. Mr. Robinson with his flock, o the Reformed Church of the North of England, removed to Amsterdam in 1606, and soon after to Leyden. A variety of motives led his congregation to turn their attention to the New World; the principal were, the enjoyment of perfect liberty of conscience; "the preservation of ecclesiastical affairs distinct from those of the State;" and a hope of laying the foundation of an extensive empire, that should be purged from all religious impurities.

Having made an arrangement with the Virginia Company, they sailed from Plymouth, Eng., on September 6, 1620, and on November 10th anchored in Cape Cod harbor. Perceiving that they were so far north as to be without the territory of the South Virginia Company, some hesitation arose;

ut the winter was at hand, and it was now o late to go in search of a settlement within the jurisdiction of that company.

Previous to their landing, after prayer nd thanksgiving, they formed themselves nto a body politic, binding themselves by a written covenant to be governed by the ecisions of a majority. This instrument was subscribed by 41 persons, who, with heir children and domestics, composed a company of 101 persons. Mr. John Carver was chosen, without one dissentient voice, governor for one year.

Saved from Famine.

Parties were sent on shore to make discoveries. Some Indians were seen but could not be overtaken. A considerable quantity of corn was found in heaps of sand, secured n baskets, which served for seed the ensuing spring, and tended to save the adventurers from famine. On December 6th, Carver, Standish, Winslow, Bradford and others, sailed to various places, to discover a suitable situation for a settlement. Monday, December 11, O. S., they landed at what was afterwards called Plymouth, and from the excellence of the harbor, and the favorable appearance of the land, resolved to commence a settlement here.

In 1637 the troops of Massachusetts and Connecticut had several engagements with the Pequot Indians, and finally subdued them. This year was made famous by a great theological disturbance caused by Ann Hutchinson, a woman of considerable talents, who was accused of maintaining heresies, and supporting them by lectures frequently given to large audiences. The result was a synod of the ministers, elders and messengers of the churches, who, after three week's deliberation, condemned as heretical eighty-two opinions which had been disseminated in New England, and some banishments took place, among them that of Mrs. Hutchinson, her husband and children.

In 1750 a number of noblemen, merchants and others, of London, together with some influential Virginia planters, formed a society under the name of the Ohio Company, for the purpose of commerce with the Indians and the settlement of parts of the country. The French Governor in Canada fearing the valuable fur trade of the French would be destroyed, infringed upon the possessions of the Ohio Company, who laid their grievances before Dinwiddie, Lieutenant-Governor of Virginia.

The Assembly of Virginia determined to demand, in the name of the King, that the French should desist. George Washington, then in his 22d year, was despatched to the French Commandant to convey the demand. As this was not complied with, the British determined to attack Fort du Quesne (now Pittsburg), and Washington commanded the expedition, which, although unsuccessful, reflected upon him great credit.

Brave to the Last.

On the arrival of Braddock, in the spring of 1775, various military operations were planned. An expedition against Canada was successful, but the conquered territory was speedily relinquished by the victors. General Braddock's expedition against Fort du Quesne was disastrous in the extreme. Heedless of the advice of Washington, who cautioned him against an ambush, he pressed forward, and was surprised by the Indians.

Instead of retreating or scouring the woods, Braddock vainly endeavored to form his men; and continued with wanton bravery on the spot where he was first attacked, till three horses were shot under him; when he received a shot through the lungs and fell.

The remains of the army immediately fled, bearing away the body of their rash and unfortunate commander. Every mounted officer except Washington, was either killed or wounded, and he was providentially preserved, for an Indian had marked him as a victim, and fired at him several times with a rifle that had never before deceived him; 64 out 85 officers, and half the privates were killed. But Washington bore off the wreck of the forces with consummate skill and undaunted courage. The war was continued until 1763, and, although the military operations were occasionally unsuccessful, the bravery of the British and provincial troops prevailed, and the fall of Quebec gave a death blow to the hopes of the French.

Events Preceding the Revolution.

We now come to the commencement of those acts which created that patrotic feeling in the colonies, which resulted in the Declaration of their Independence.

In 1674 the Parliament of Great Britain passed an act, the preamble to which ran thus: "Whereas it is *just and necessary* that a *revenue* be raised in America, for defraying the expenses of defending, protecting and securing the same, etc." The act then proceeds to lay a duty on clayed sugar, indigo, coffee, silk, molasses, calicoes, etc., being the produce of a colony not under the dominion of his majesty. To this the colonists submitted; though not without complaint and remonstrance.

Massachusetts recommended a colonial congress, to consult for the general welfare. A congress from most of the colonies, consisting of twenty-eight members, met at New York; remonstrated against the Act of Parliament; petitioned for its repeal; and made a declaration of the rights of the colonies; declaring that taxation and representation were inseparable; and that Parliament had no right take their money without their consent.

In 1767, the Chancellor of the Exchequ brought into Parliament a bill for imposin a duty to be collected in the colonies on glas, paper, painter's colors and tea.

The Tea Thrown Overboard.

The colonists were again violently excite The corresponding committees, which ha been forming throughout the colonies for th last two years, excited resistance, declarin such as aided directly or indirectly in thes violations of liberty, enemies to their countr The consequence was that the cargoes of te sent to New York and Philadelphia, wer sent back: and those sent to Charleston stored, but not offered for sale. The te ships, intended for the supply of Boston, afte the inhabitants had tried in vain to have ther returned, they being consigned to the re lations of Governor Hutchinson, were entere by about seventeen persons in the disguis of Indians, and three hundred and forty-tw chests of tea were thrown into the dock, n other damage being done.

In January, 1775, the Earl of Chatham brought forward a conciliatory bill in th House of Peers, which was rejected two t one. Lord North, the Prime Minister, intro duced a bill for restraining the trade of th New England colonies. Receiving information of the general opposition in the southern colonies, he introduced another bill, equally restraining their trade, but excepting North Carolina, Delaware and New York.

The time had now come for testing the nerve of the colonists. An attempt was made by the British troops to seize the military stores at Concord, April 19, but they had to encounter the armed opposition of the militia at Concord and Lexington. Boston was now blockaded. Ticonderoga and Crown Point were taken. The battle of Bunker's Hill followed, and an unsuccessful expedition against Canada preceded the Declaration of Independence.

On May 10, 1775, the Continental Congress met at Philadelphia, and on June 15, unanimously elected George Washington, then a member from Virginia, Commander-in-Chief of the forces raised, and to be raised, for the defence of the colonies. June 7, 1776, Richard Henry Lee, of Virginia, made a motion in Congress, for declaring the colonies free and independent. After much debate, on the Fourth of July, the thirteen colonies were declared free and independent, under the title of The United States of America.

Gallant Defence of the Fort.

An attempt was made in June and July, with 3000 British troops, under the command of General Clinton and Sir Peter Parker, to destroy the fort on Sullivan's Island, near Charleston (S. C.). The fort was defended by Colonel Moultrie with about 400 men. After an action of ten hours, the British were forced to retire with a loss of about 200 men. Ten Americans were killed and 20 wounded.

Soon after the evacuation of Boston by the British troops, March 17, Washington made his headquarters at the city of New York, with the principal part of the army. British troops to the number of 24,000 men under Lord Howe, and his brother, Sir William Howe, landed, August 22, on Long Island near the Narrows, about nine miles rom the city. The American forces, at this ime, amounted to upwards of 17,000 men, and those principally raw recruits.

A battle was fought on Long Island, August 27, in which the Americans were defeated. The battle of White Plains took place on October 28. The retreat of the American forces through the Jerseys and across the Delaware followed; the battles of Trenton, December 26, and Princeton, January 3, 1777, were also among the events of this period.

The campaign of 1777 closed under better circumstances. General Burgoyne surrendered at Saratoga, October 17. In 1778 a treaty of commerce and alliance was made between Louis XVI and the Commissioners of the United States, on February 6th. French troops soon after arrived. Various military operations ensued. In the Southern States, where there was no regular American army, the partisan warfare kept up by Marion, Sumter, Morgan, and Green, thinned the ranks of their enemies. On October 19, 1781, Cornwallis surrendered at Yorktown. The fall of this large British army may be considered as the closing of the war.

Public Thanksgiving.

General Washington ordered divine service in the different divisions and brigades. Congress went in solemn procession to the Dutch Lutheran Church in Philadelphia, returned thanks to Almighty God for the success of the combined armies, and recommended a day of general thanksgiving and prayer throughout the United States.

Savannah was evacuated in July, 1782, and Charleston in December. Great Britain acknowledged our independence November 30, 1782. Holland acknowledged the independence of the United States in April; Sweden in February, 1783; Denmark in the same month; Spain in March; Russia in July.

The debt of the United States, at the close of the war, was $40,000,000. Congress had power to make war, and to create debts, but no power to carry on the war, nor ability to pay debts, but by appeals or recommendations to thirteen independent sovereignties, whose unanimity alone, seldom to be expected could support public credit, or give efficacy to the proceedings of Congress.

The new Federal Government was established in 1789. Washington was unanimously chosen first President, and John Adams Vice-President. Mr. Jefferson was selected for the Department of State.

Depredations by France.

The Indian War and an insurrection in the western part of Pennsylvania, on account of the tax on domestic spirits were favorably terminated. The insults and maritime depredations committed by the French, induced America to take up arms in defence of her rights, but a change of rulers in France prevented the effusion of blood. On the retirement of Washington, John Adams was elected to succeed him, and in 1801, Thomas Jefferson was chosen the third President of the United States.

The claim of searching American vessels, and impressing from them British seamen, and the British orders in council prohibiting the exportations of the United States, together with other outrages committed by the British, produced a declaration of war against Great Britain in June, 1812. The successes of the British were but few and trifling, while the American navy triumphed in a series of brilliant exploits, and the gallant defence of New Orleans by Gen. Andrew Jackson, crowned the American arms with laurels. Peace was concluded at Ghent, December 24, 1814.

The next great event of national importance was the war with Mexico. What is now known as Texas was claimed by that country. The territory was sparsely settled, mainly by adventurers from the Southern States. In 1836 Texas revolted from Mexico and established a Republic. In 1845 Texas was annexed or re-annexed to the Unite States and admitted as a State. A disput with Mexico at once arose as to its Wester boundary and war followed, the Union force being commanded by Gen. Zachary Taylo and Gen. Winfield Scott. The war resulte disastrously to the Mexicans under Gen Santa Anna, and a treaty of peace was concluded in 1848.

The Irrepressible Conflict.

The subject of slavery created a growin agitation throughout the country, whic resulted in the formation of the Republica party in 1856, with Col. John C. Fremon as its candidate for the Presidency. I sprang rapidly into power, but failed t obtain a majority of the votes of the Elec toral College. The agitation of the subjec of slavery continued with great vigor an bitterness. Upon the election of Abraha Lincoln as President in 1860, eleven of th Southern States seceded and formed an independent government.

The people of the North resisted the dismemberment of the Union and the grea Civil War followed. In January, 1863 President Lincoln, by proclamation declare the slaves in the part of the South then i rebellion, free. The character of the struggle was at once changed in the eyes of foreigners, and the sympathy of the outsid world turned gradually to the North. Th struggle between the North and the Sout was one of vast magnitude. Sanguinar battles were fought on land and water. A length the Federal forces, under Gen. Ulyss S. Grant, were victorious, and on April 9 1865, the Confederate army, under Gen Robert E. Lee, surrendered at Appomatto Court House, Va.

On April 15, 1865, President Lincoln wa assassinated at Washington, and an attemp was made upon the life of Mr. Seward, Secretary of State. The war had cost the nation some $10,000,000,000.

The seceded States were again taken into the Union on conditions contained in the 13th, 14th and 15th amendments to the Constitution, abolishing slavery, and giving the negro the right to vote. In 1867 the United States purchased Alaska from Russia. In 1884 the Democratic party reorganized and elected its candidate, Mr. Cleveland, over Mr. Blaine. In 1888 the Democrats made the campaign on the basis of a reformed tariff. The Republicans won, Mr. Harrison becoming President, and by passing what are known as the McKinley Bill and the Administrative Bill reformed the tariff in the directive of protection to American industries.

Result of Election.

In 1890 a House of Representatives overwhelmingly Democratic was elected.

In 1892 the election resulted in the return of the Democratic candidate, Mr. Cleveland, by a large majority over Mr. Harrison. Mr. Cleveland was inaugurated on March 4, 1893.

On the first of May following, the World's Fair was opened at Chicago, the object of which was to commemorate the discovery of America by Columbus.

The elections of November, 1894, resulted in Republican victories all over the Union.

The Presidential campaign of 1896, which was one of unusual excitement on account of the monetary questions involved, resulted in the election of Hon. William McKinley as President and Hon. Garret A. Hobart as Vice-President, the former of Ohio and the latter of New Jersey. Mr. McKinley was inaugurated March 4, 1897.

The insurrection which broke out in Cuba in 1895 continued, and was a subject of grave consideration by our Government. On the 15th of February, 1898, the United States battleship Maine was destroyed in the harbor of Havana, resulting in the death of 266 officers and men. This unfortunate incident had much to do in precipitating the war with Spain, which was declared by the United States, April 21, 1898.

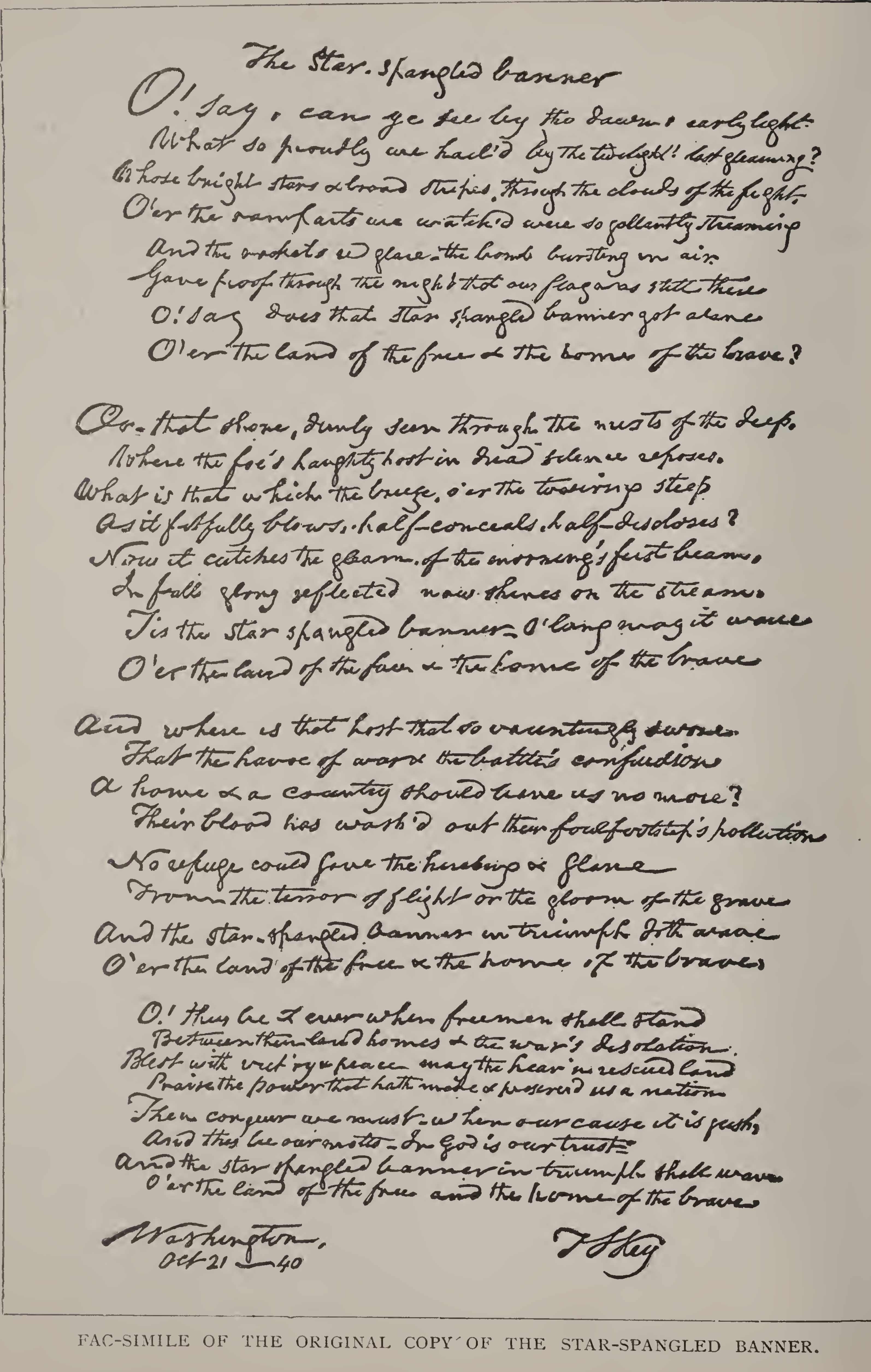
The coast of Cuba was at once blockaded by the North Atlantic squadron. On May 1st, the United States Asiatic fleet, under Admiral Dewey, destroyed the Spanish squadron in the harbor of Manila, gaining thereby a great naval victory.

Thrilling Events.

An attack on Santiago de Cuba by United States troops under command of General Shafter resulted in the capture of that city in the early part of July. On the 3rd of the same month the Spanish squadron, under Admiral Cervera, attempted to escape from the harbor of Santiago and was totally destroyed by the United States fleet. A treaty of peace between Spain and the United States followed, which was signed by the Commissioners of the two countries on December 10th, and ratified by the United States Senate, February 6, 1899.

On September 8, 1900, Galveston, Texas, was visited by a storm which swept the sea over the city and resulted in the loss of nearly 5000 lives.

President McKinley was assassinated at the Pan-American Exposition at Buffalo, on September 6, 1901, by Leon Czolgosz, an Anarchist. He died September 14, and was buried on the 19th at Canton, Ohio, amidst an unparalleled demonstration of public sorrow. Vice-President Roosevelt became President.



The Star-spangled banner

O! say, can ye see by the dawn's early light
What so proudly we hail'd by the twilight's last gleaming?
Whose bright stars & broad stripes, through the clouds of the fight,
O'er the ramparts we watch'd were so gallantly streaming
And the rockets red glare, the bombs bursting in air,
Gave proof through the night that our flag was still there
O! say does that star spangled banner yet wave
O'er the land of the free & the home of the brave?

On that shore, dimly seen through the mists of the deep,
Where the foe's haughty host in dread silence reposes,
What is that which the breeze, o'er the towering steep,
As it fitfully blows, half-conceals, half-discloses?
Now it catches the gleam of the morning's first beam,
In full glory reflected now shines on the stream,
'Tis the star spangled banner, O! long may it wave
O'er the land of the free & the home of the brave

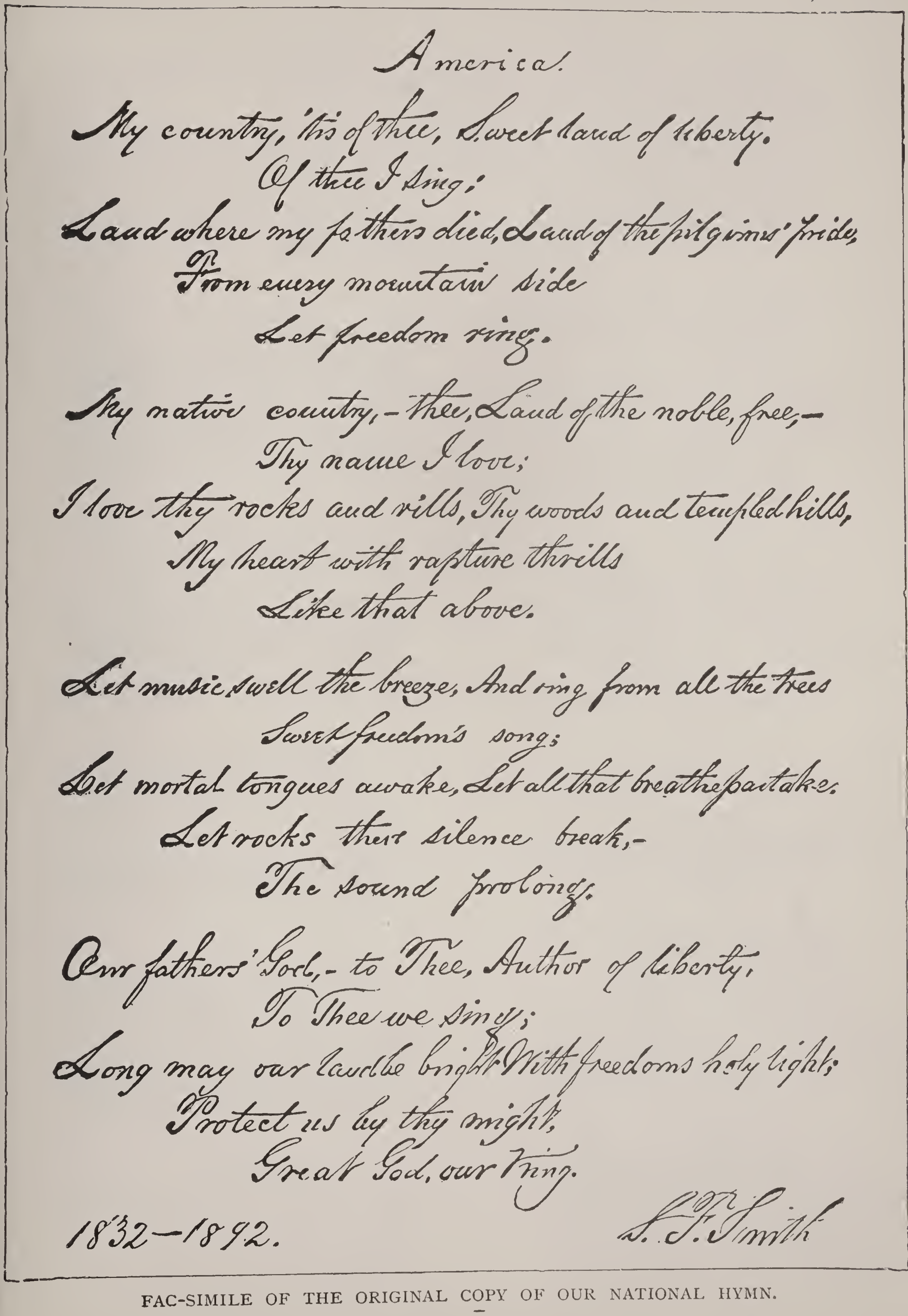
And where is that host that so vauntingly swore
That the havoc of war & the battle's confusion
A home & a country should leave us no more?
Their blood has wash'd out their foul footstep's pollution
No refuge could save the hireling & slave
From the terror of flight or the gloom of the grave
And the star-spangled banner in triumph doth wave
O'er the land of the free & the home of the brave.

O! thus be it ever when freemen shall stand
Between their lov'd homes & the war's desolation;
Blest with vict'ry & peace may the heav'n rescued land
Praise the power that hath made & preserv'd us a nation
Then conquer we must, when our cause it is just,
And this be our motto — In God is our trust
And the star spangled banner in triumph shall wave
O'er the land of the free and the home of the brave

Washington,
Oct 21 — 40

F. S. Key

FAC-SIMILE OF THE ORIGINAL COPY OF THE STAR-SPANGLED BANNER.



America.

My country, 'tis of thee, Sweet land of liberty,
Of thee I sing;
Land where my fathers died, Land of the pilgrims' pride,
From every mountain side
Let freedom ring.

My native country,—thee, Land of the noble, free,—
Thy name I love;
I love thy rocks and rills, Thy woods and templed hills,
My heart with rapture thrills
Like that above.

Let music swell the breeze, And ring from all the trees
Sweet freedom's song;
Let mortal tongues awake, Let all that breathe partake,
Let rocks their silence break,—
The sound prolong.

Our fathers' God,—to Thee, Author of liberty,
To Thee we sing;
Long may our land be bright With freedoms holy light;
Protect us by thy might,
Great God, our King.

1832–1892.
S. F. Smith

FAC-SIMILE OF THE ORIGINAL COPY OF OUR NATIONAL HYMN.

Go: Washington

John Adams

Th: Jefferson

James Madison.

Jas Monroe.

J. Q. Adams

Andrew Jackson

M Van Buren

W H Harrison

J. Tyler

James K. Polk

Z. Taylor.

Millard Fillmore

Franklin Pierce

James Buchanan

A. Lincoln.

Andrew Johnson

U. S. Grant

R B Hayes

J A Garfield

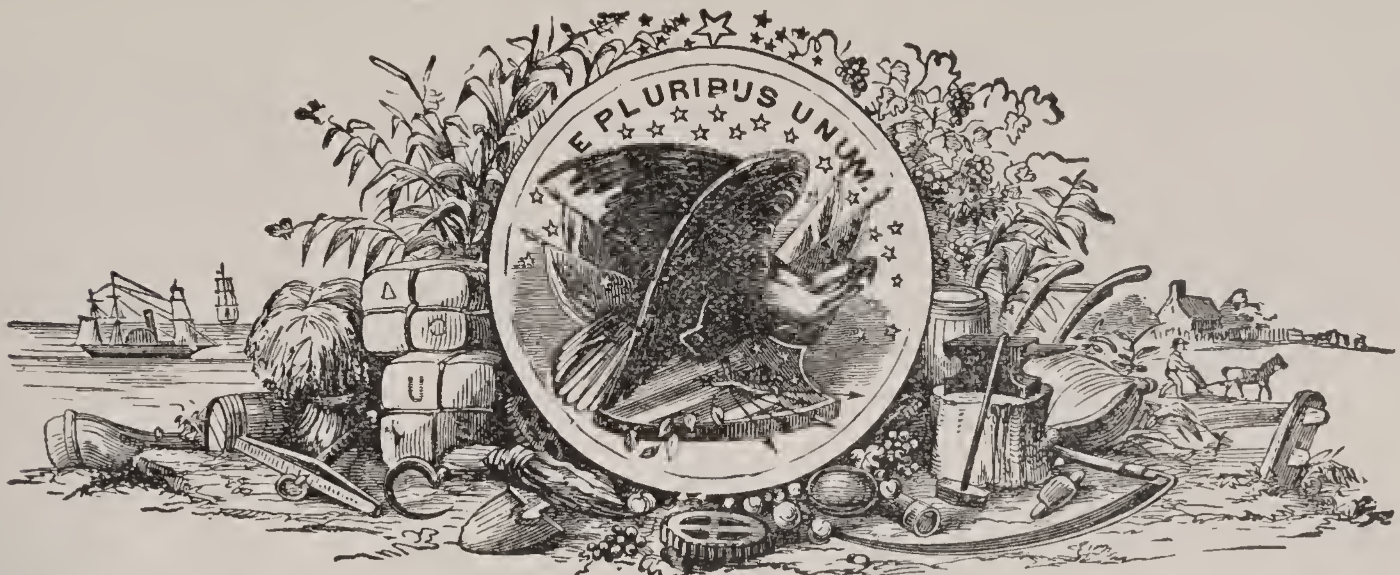
Chester A. Arthur.

Grover Cleveland

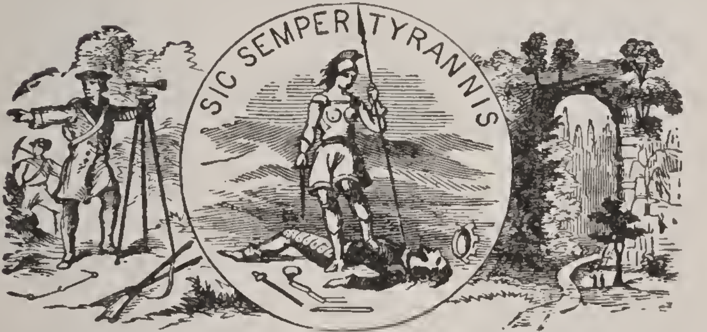
Benj Harrison

W McKinley

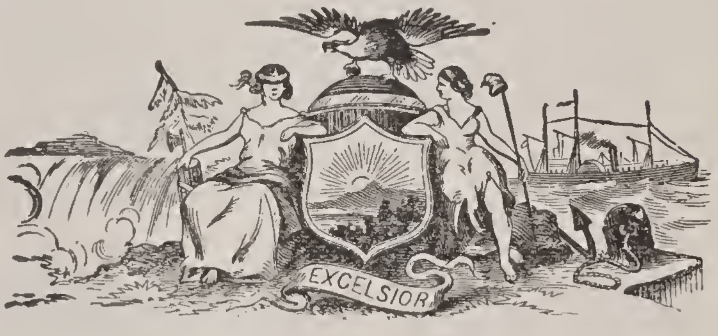
AUTOGRAPHS OF THE PRESIDENTS



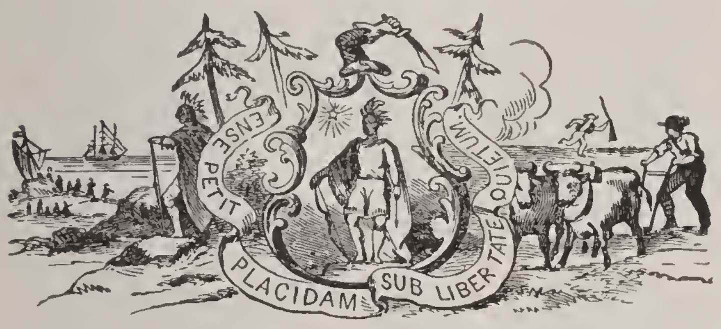
GREAT SEAL OF THE UNITED STATES.



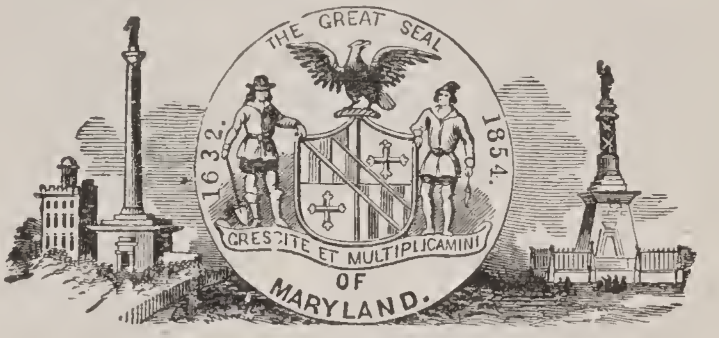
COAT-OF-ARMS OF VIRGINIA.



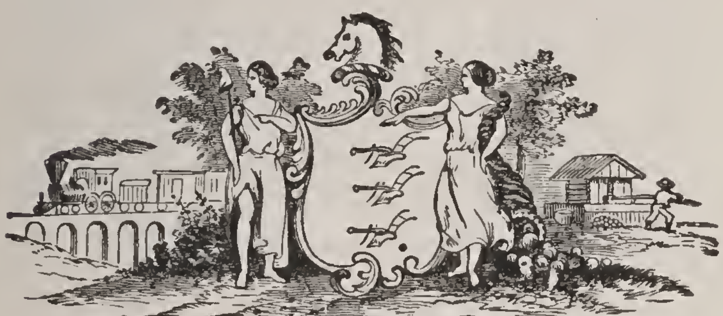
COAT-OF-ARMS OF NEW YORK.


ENSE PETIT PLACIDAM SUB LIBERTATE QUIETUM

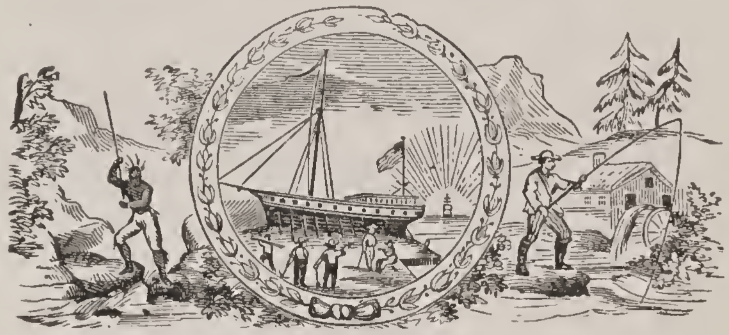
COAT-OF-ARMS OF MASSACHUSETTS.



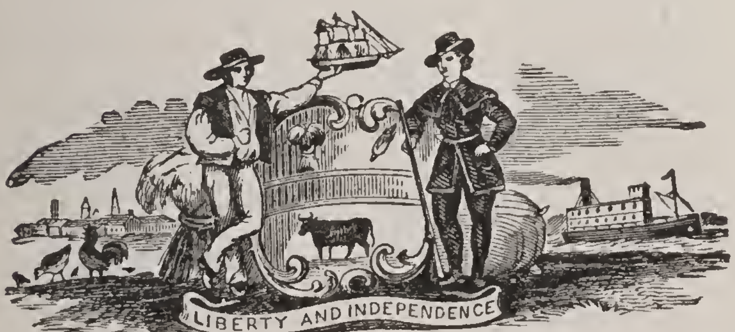
COAT-OF-ARMS OF MARYLAND.



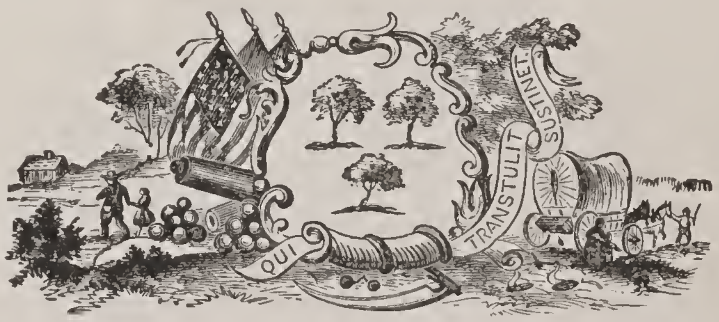
COAT-OF-ARMS OF NEW JERSEY.



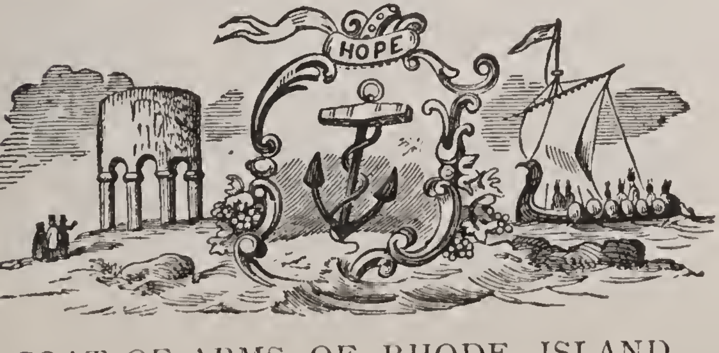
COAT-OF-ARMS OF NEW HAMPSHIRE.



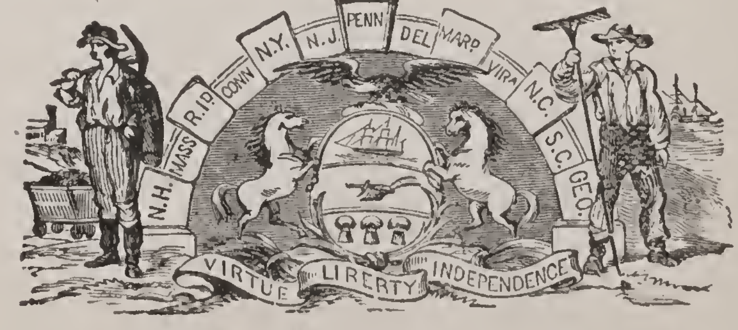
COAT-OF-ARMS OF DELAWARE.


QUI TRANSTULIT SUSTINET.

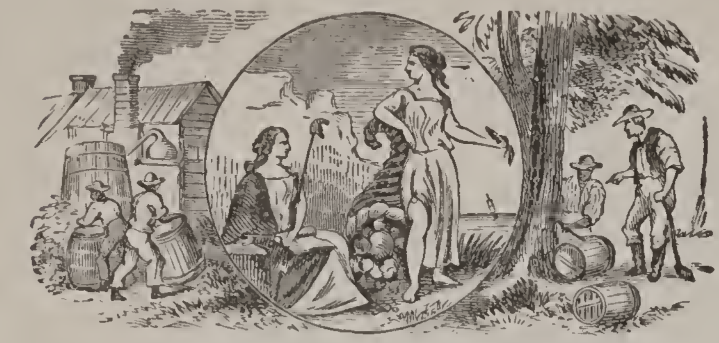
COAT-OF-ARMS OF CONNECTICUT.



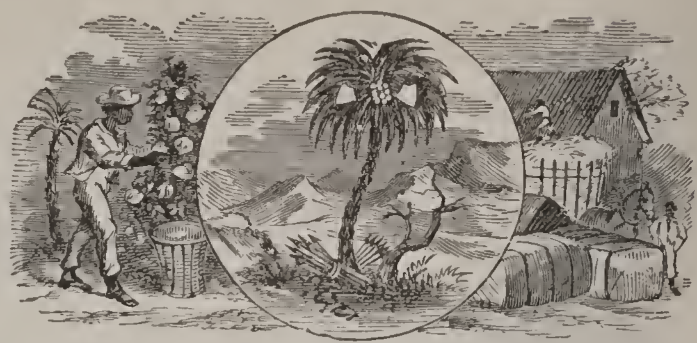
COAT-OF-ARMS OF RHODE ISLAND.



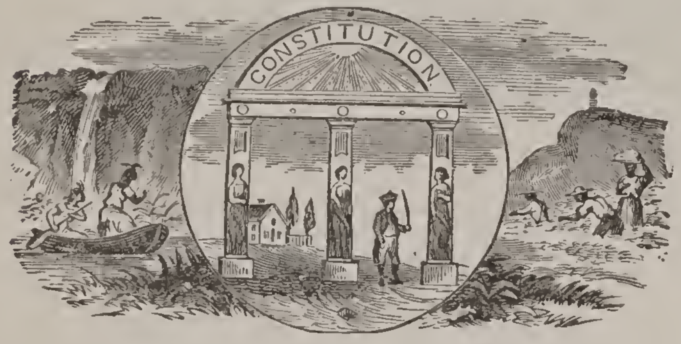
COAT-OF-ARMS OF PENNSYLVANIA.



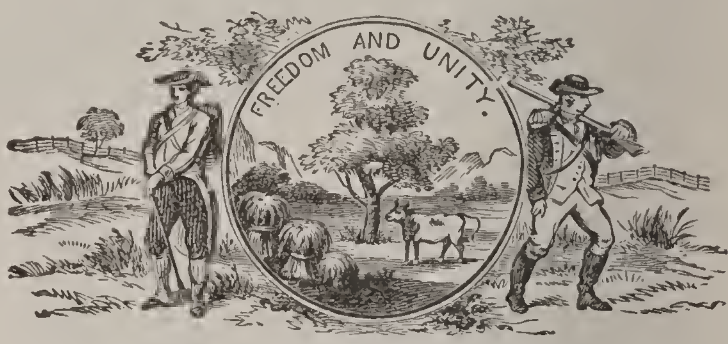
COAT-OF-ARMS OF NORTH CAROLINA.



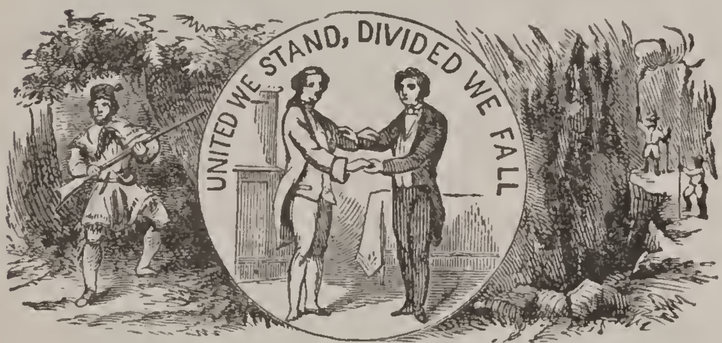
COAT-OF-ARMS OF SOUTH CAROLINA.



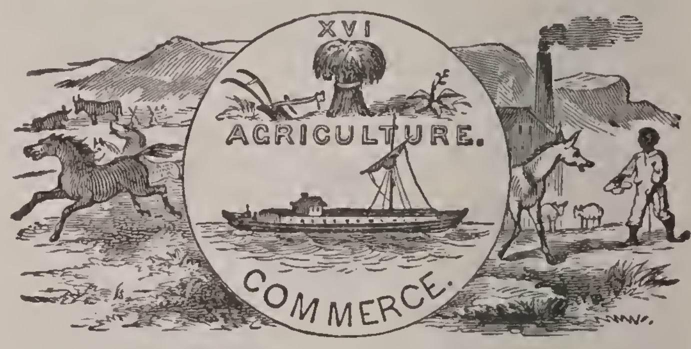
COAT-OF-ARMS OF GEORGIA.


FREEDOM AND UNITY.

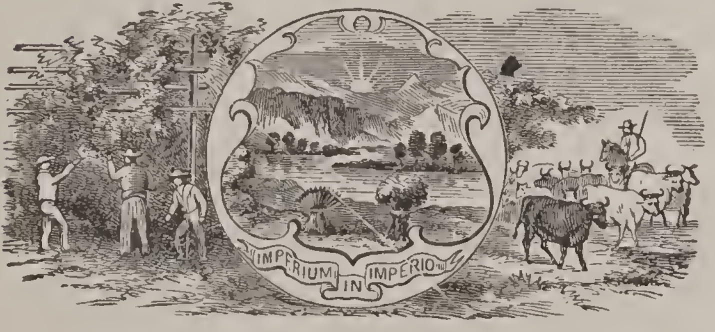
COAT-OF-ARMS OF VERMONT.


UNITED WE STAND, DIVIDED WE FALL

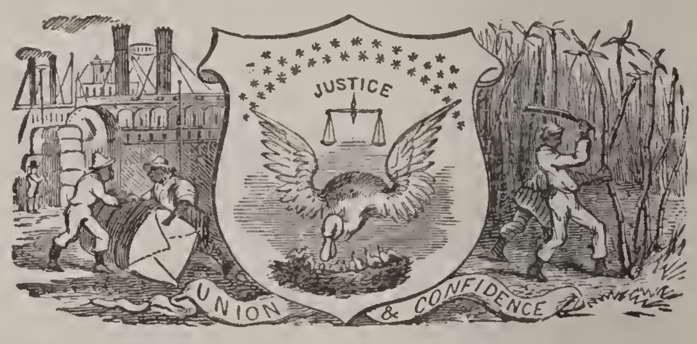
COAT-OF-ARMS OF KENTUCKY.



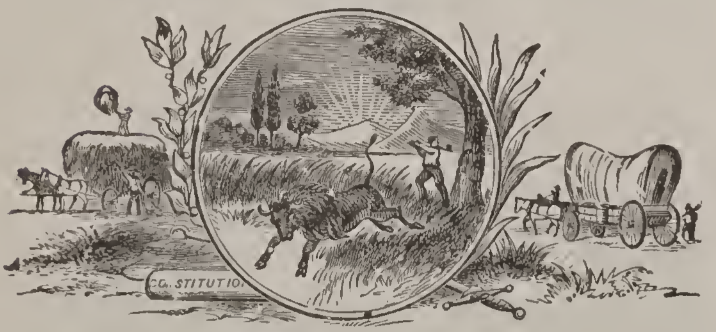
COAT-OF-ARMS OF TENNESSEE.



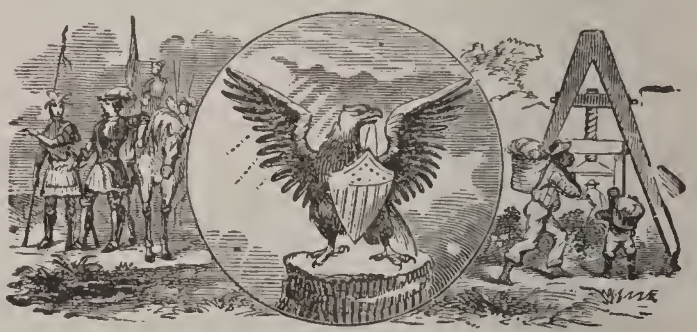
COAT-OF-ARMS OF OHIO.



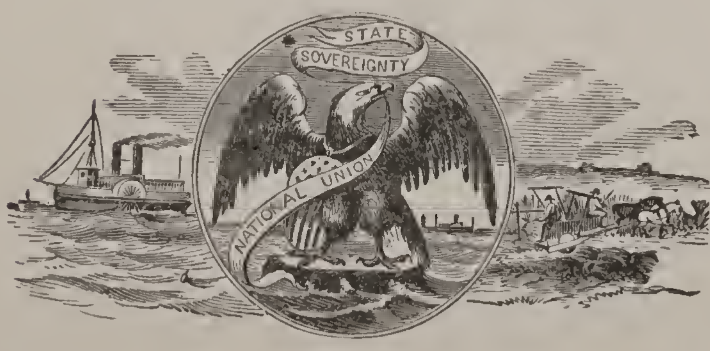
COAT-OF-ARMS OF LOUISANA.



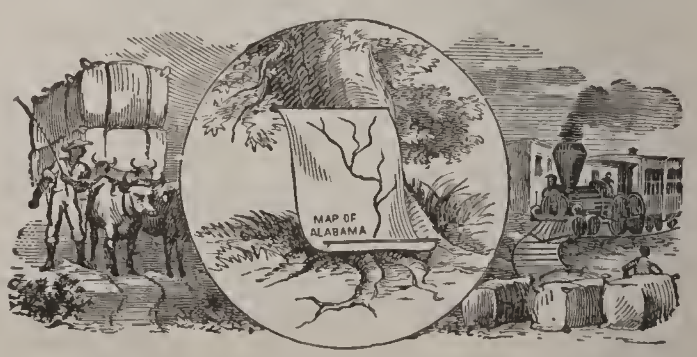
COAT-OF-ARMS OF INDIANA.



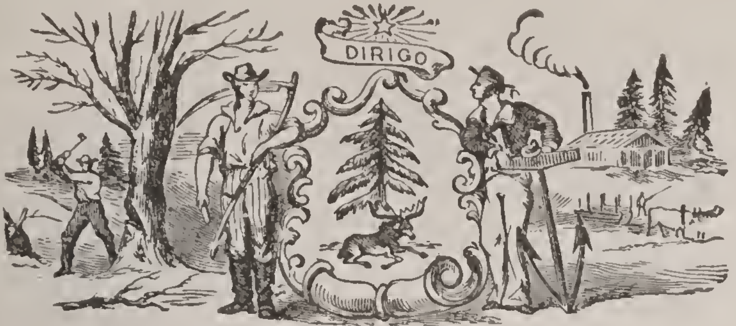
COAT-OF-ARMS OF MISSISSIPPI.



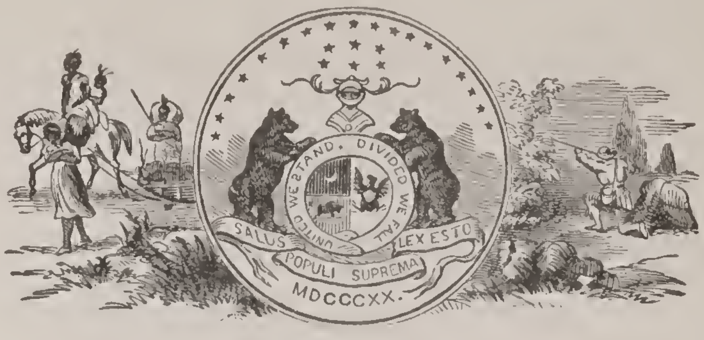
COAT-OF-ARMS OF ILLINOIS.



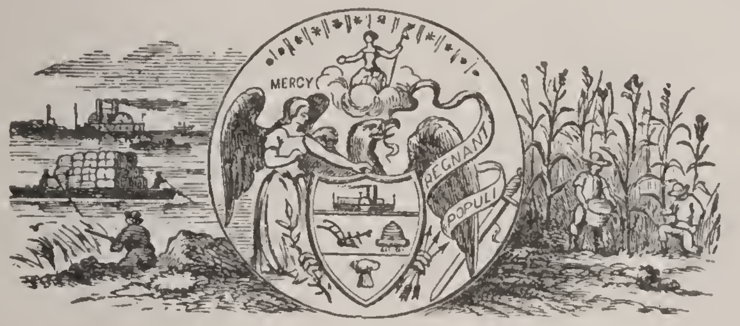
COAT-OF-ARMS OF ALABAMA.



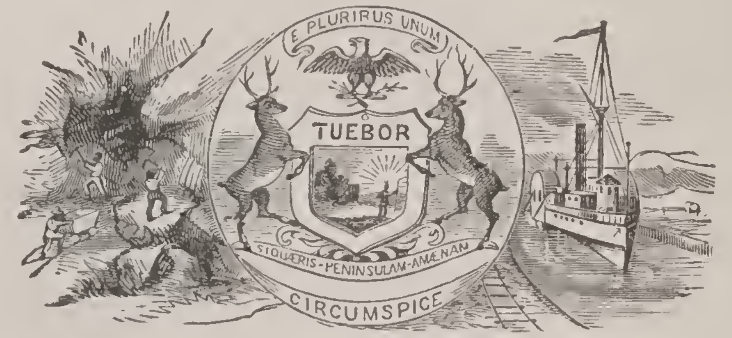
COAT-OF-ARMS OF MAINE.


WE STAND, DIVIDED WE FALL
UNITED
SALUS POPULI SUPREMA LEX ESTO
MDCCCXX.

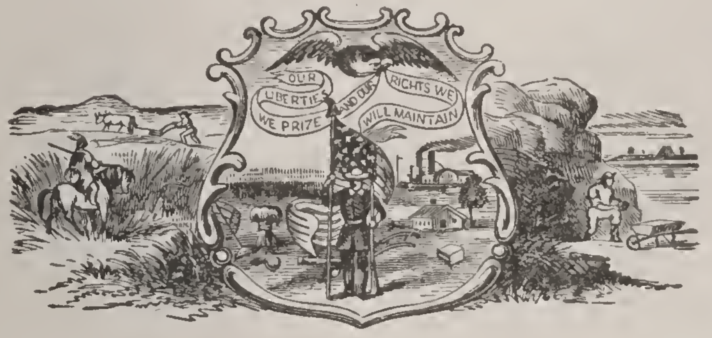
COAT-OF-ARMS OF MISSOURI.



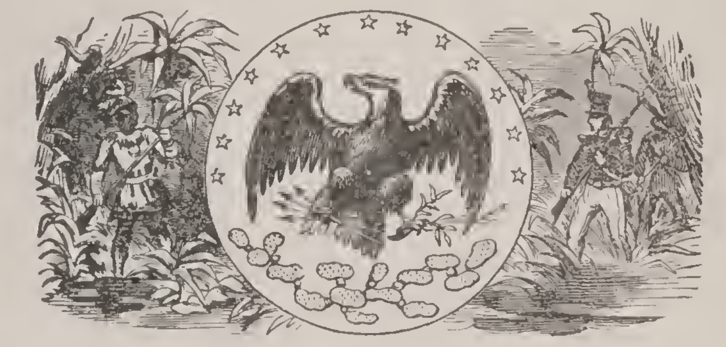
COAT-OF-ARMS OF ARKANSAS.



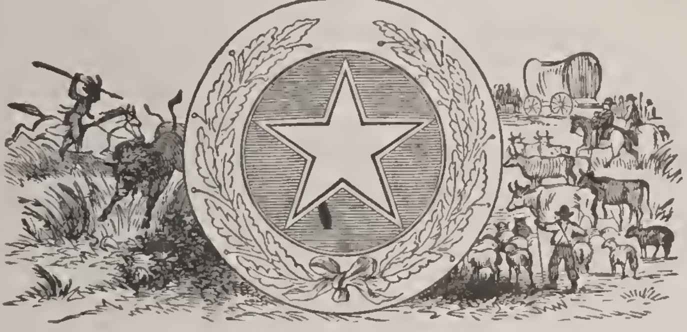
COAT-OF-ARMS OF MICHIGAN.


OUR LIBERTIES WE PRIZE AND OUR RIGHTS WE WILL MAINTAIN

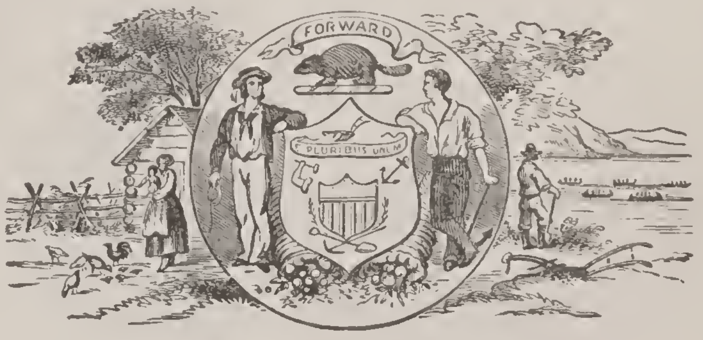
COAT-OF-ARMS OF IOWA.



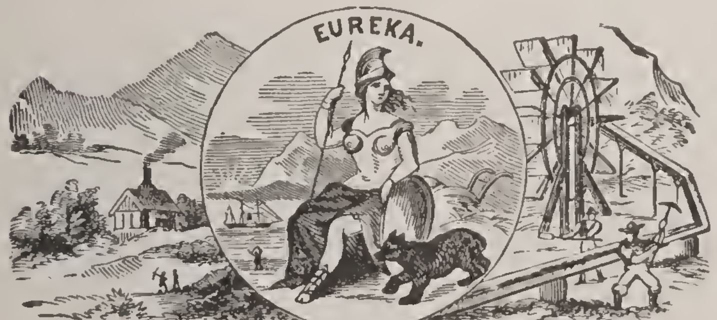
COAT-OF-ARMS OF FLORIDA.



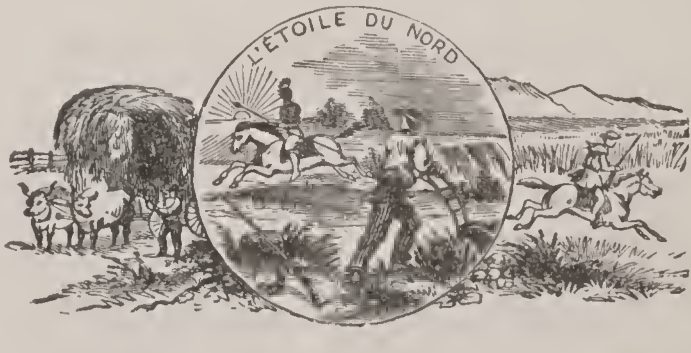
COAT-OF-ARMS OF TEXAS.



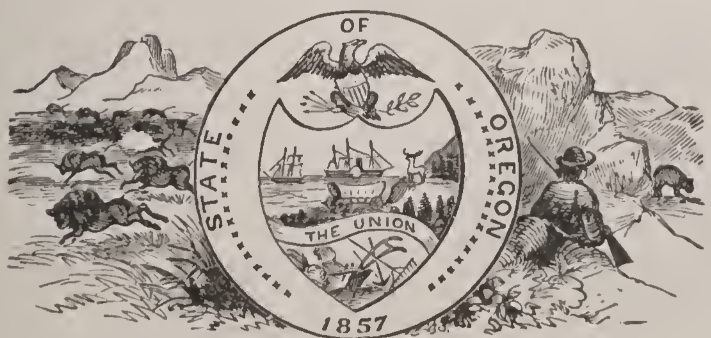
COAT-OF-ARMS OF WISCONSIN.



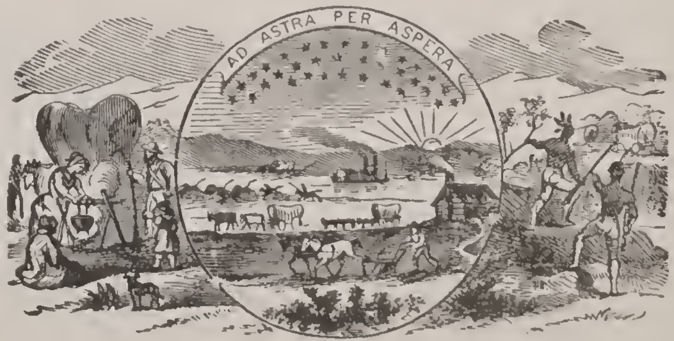
COAT-OF-ARMS OF CALIFORNIA.



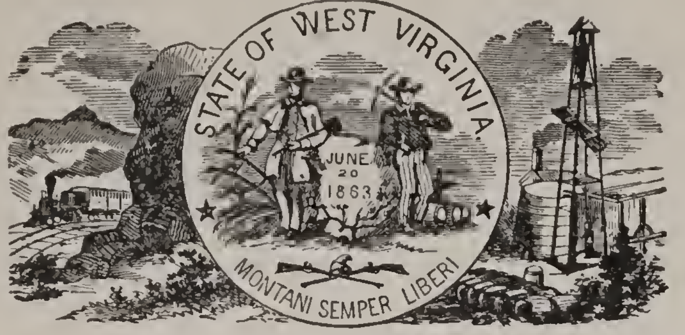
COAT-OF-ARMS OF MINNESOTA.



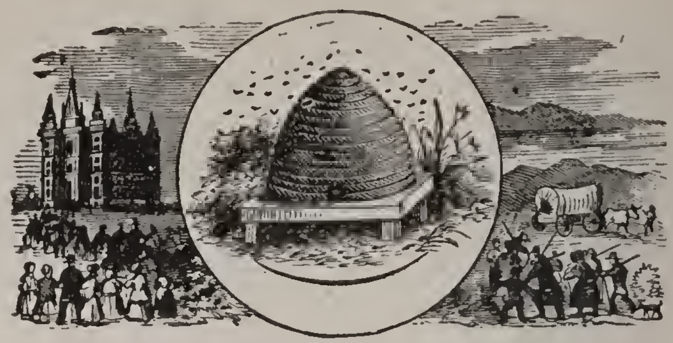
COAT-OF-ARMS OF OREGON.



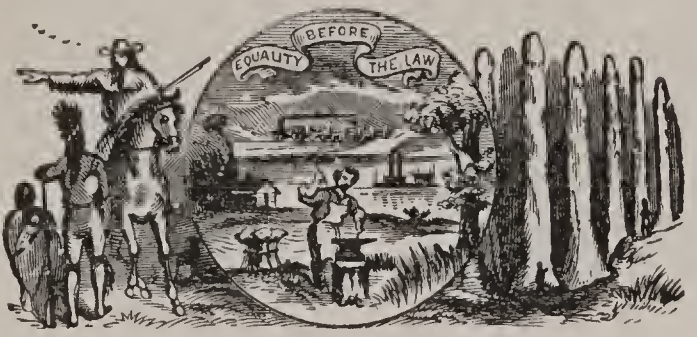
COAT-OF-ARMS OF KANSAS.



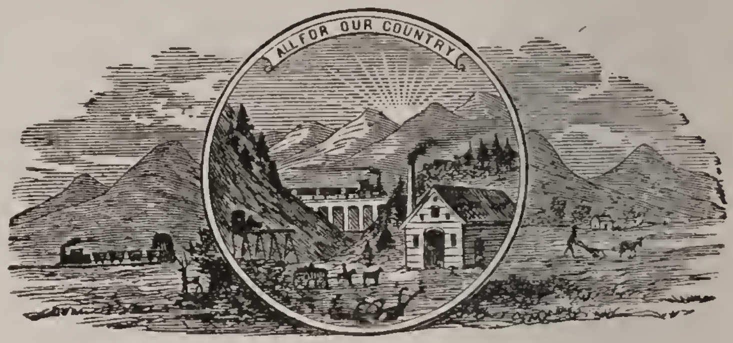
COAT-OF-ARMS OF WEST VIRGINIA.



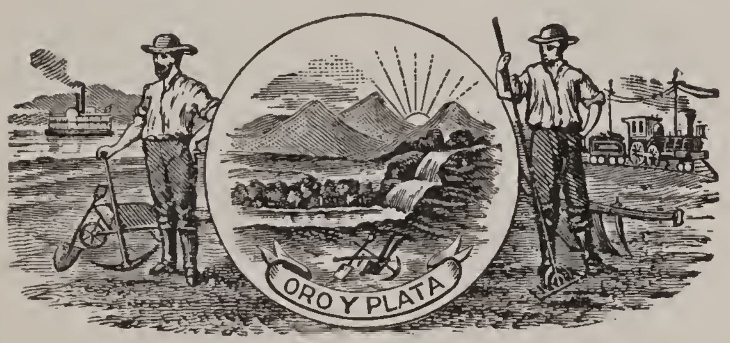
COAT-OF-ARMS OF UTAH.



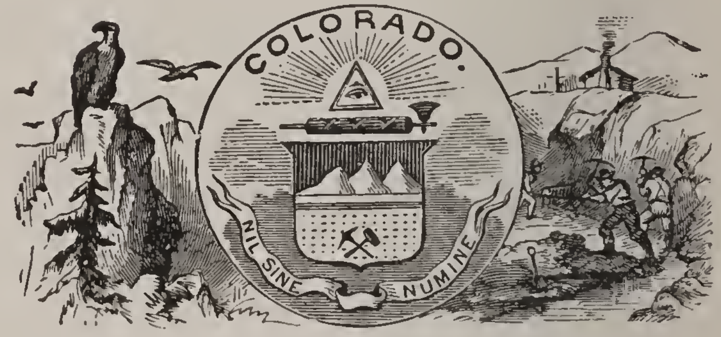
COAT-OF-ARMS OF NEBRASKA.



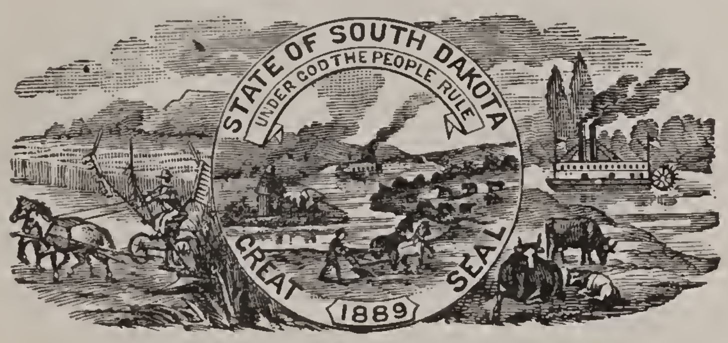
COAT-OF-ARMS OF NEVADA.



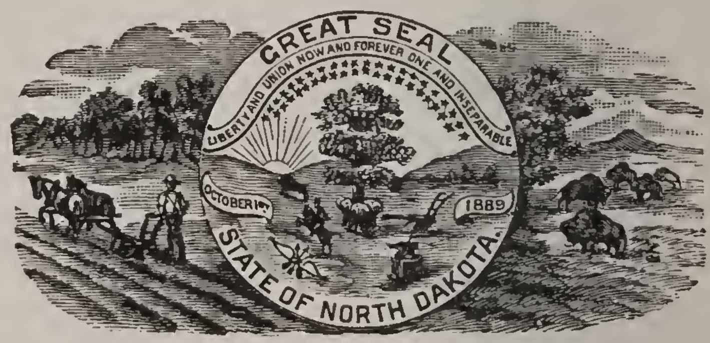
COAT-OF-ARMS OF MONTANA.



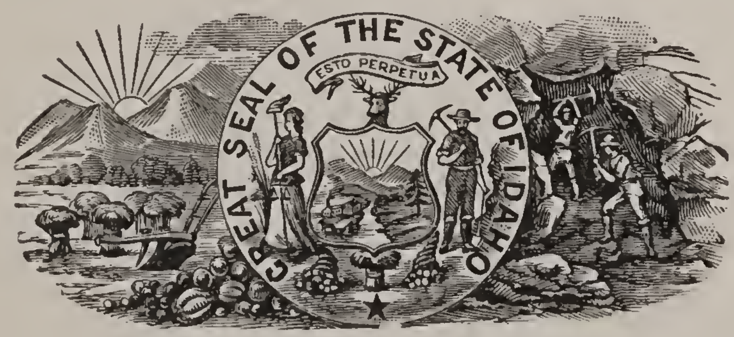
COAT-OF-ARMS OF COLORADO.



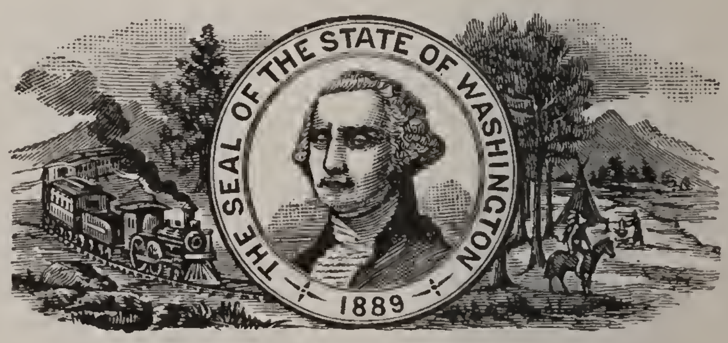
COAT-OF-ARMS OF SOUTH DAKOTA.


GREAT SEAL
LIBERTY AND UNION NOW AND FOREVER ONE AND INSEPARABLE
OCTOBER 1ST
1889
STATE OF NORTH DAKOTA

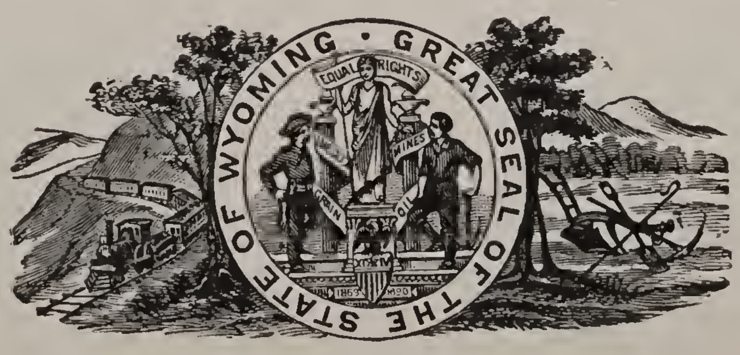
COAT-OF-ARMS OF NORTH DAKOTA.


GREAT SEAL OF THE STATE OF IDAHO
ESTO PERPETUA

COAT-OF-ARMS OF IDAHO.


THE SEAL OF THE STATE OF WASHINGTON
1889

COAT-OF-ARMS OF WASHINGTON.


GREAT SEAL OF THE STATE OF WYOMING
EQUAL RIGHTS
MINES
1869
1890

COAT-OF-ARMS OF WYOMING.

THE DOMINION OF CANADA

IN 1534 Jacques Cartier, a French navigator, a native of St. Malo, set out from that port with two small vessels of twenty tons each, landed on the shores of Gaspe (now part of the province of Quebec), and took possession of the country in the name of his sovereign, Francis I. He went again in the following year (1535), passed up the gulf and river, which he named the St. Lawrence, and reached Stadacone, the site of the present city of Quebec. Continuing his voyage, he arrived at Hochelago, another Indian town, and gave it the name of Mont Royal, since corrupted into Montreal.

After passing the winter at Stadacone, he returned to France. But little or nothing was done to promote the colonization of the country until 1608, when Samuel de Champlain, a Frenchman of gentle birth, maritime and military experience, and much religious enthusiasm, visited Canada for the third time, with the object of extending Christianity and developing trade and commerce, and founded the city of Quebec, the name of which is said to be derived from an Indian word kebec, "the rock."

The control of the immense region, extending eastward to Acadia (Nova Scotia), westward to Lake Superior, and down the Mississippi as far as the Gulf of Mexico, was from this time until 1763 claimed by France. Recollet and Jesuit missionaries traversed it in all directions, suffering great hardships in their endeavors to convert the Indians. Their work was watched with much enthusiasm in France, and it is admitted that they were the first explorers of the country and the pioneers of civilization in the Far West.

The claims of France were not, however, undisputed, as is shown by the grant of a charter in 1670 by Charles II to Prince Rupert and his company, known ever since as the Hudson Bay Company of the exclusive right of trading in the territory watered by streams flowing into Hudson Bay. As already mentioned, they gave up their exclusive rights in 1869 on certain conditions, among others, a money payment of £300,000 and a large grant of land.

Long and Bitter Struggle.

The struggle between Great Britain and France for supremacy in North America was long and bitter, but it terminated finally in 1763 by the cession to the former under the Treaty of Paris of Canada with all its dependencies, except the Islands of St. Pierre and Miquelon, which were retained as fishing stations, not to be fortified or garrisoned. Hudson Bay with the adjacent territory, Nova Scotia and Newfoundland had been previously transferred to England by the Treaty of Utrecht in 1713. The population of Canada in 1763 was about 70,000, of Nova Scotia, 8000.

No time was lost in attempting to adapt British institutions to the new possession; but considerable friction occurred for some years, and it was not altogether allayed by the passing in 1774 of what is known as the Quebec Act. This gave the French-Canadians the free exercise of their religion, and secured their civil rights, laws and customs. It annexed large territories to Quebec, including that part of the United States now forming Minnesota, Wisconsin, Michigan, Ohio, Indiana and Illinois, which passed from Great Britain in 1783.

Quebec was eventually in 1791 divided into Upper and Lower Canada; but this did not prove satisfactory in either province, leading to conflicts between the popular and elected assemblies and the nominated or official councils, and ultimately to the unsuccessful rebellion in 1837-38.

The representatives from each province in the united parliament were equal in number. Upper Canada, however, made greater progress than Lower Canada (the population in 1851 was 952,004 and 890,261 respectively, and in 1861, 1,396,061 and 1,111,566), and agitated for an additional number of members and claimed other concessions, but the demands were always opposed by the latter. The consequence was frequent legislative deadlocks and continual difficulties. Such was the state of things in 1864.

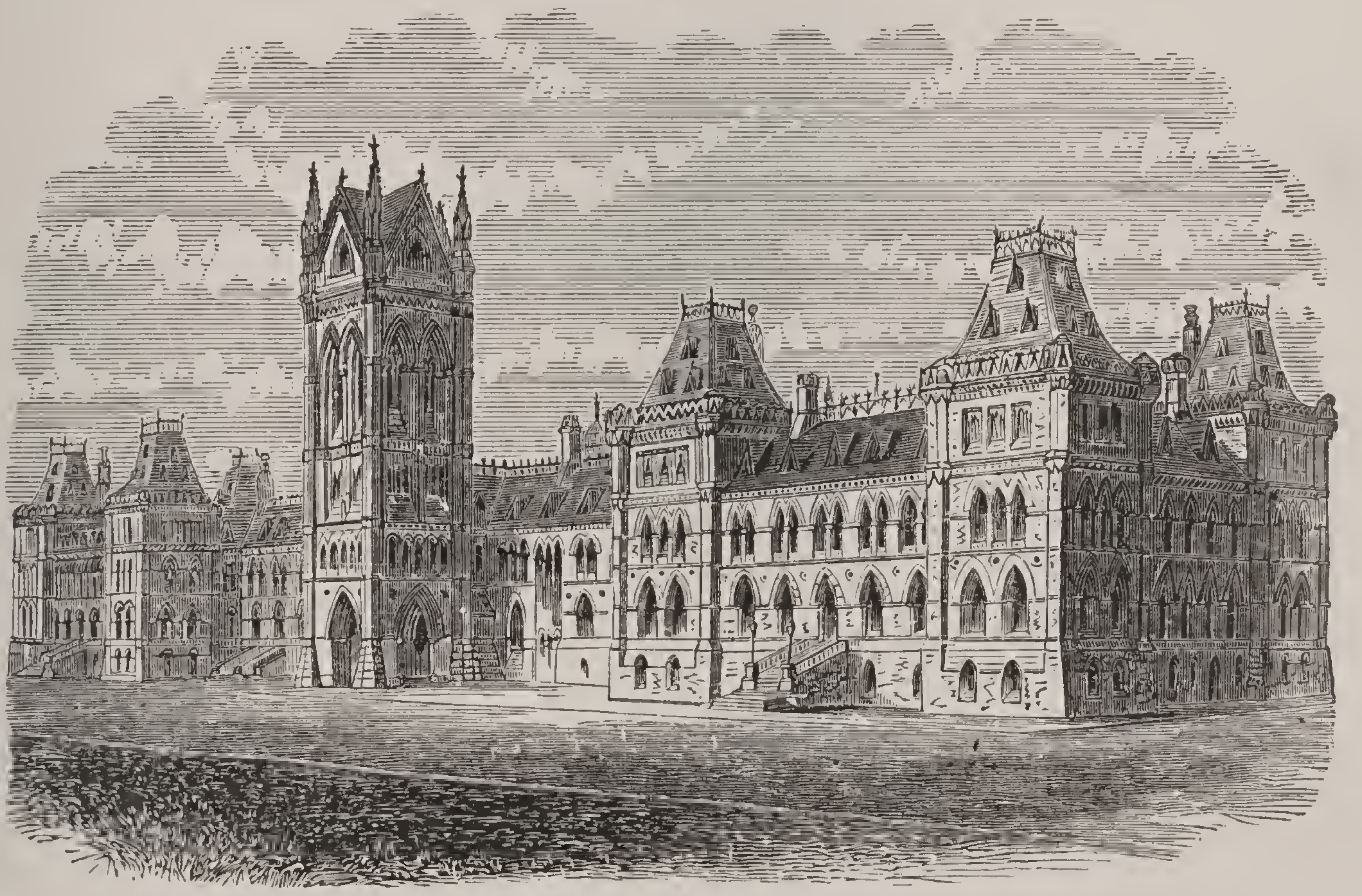
It is now necessary to refer to the other colonies on the Atlantic and Pacific coasts.

UNIVERSITY OF TORONTO.

In accordance with Lord Durham's recommendations, the two provinces were reunited in 1840 (population of Upper Canada, 450,000; of Lower Canada, 650,000), but the union was not a success politically, although it indirectly led to the great confederation in 1867. It should be mentioned that the inhabitants of Upper Canada consisted largely of United Empire loyalists, who remained loyal to British institutions, and who left the United States at the close of the War of Independence, while those of Lower Canada were almost exclusively French-Canadians.

In 1770 St. John Island (renamed Prince Edward Island in 1780), and in 1784 New Brunswick, were formed out of Nova Scotia into separate colonies. In 1858, owing to the rush for gold and the influx of population, British Columbia was make a crown colony, and in 1866 Vancouver Island was joined to it. In 1864 the maritime provinces were discussing the desirability of local confederation, and advantage of the opportunity was taken by Canada to propose a broader scheme to cover all British North America, and after several conferences a basis of union was agreed upon which resulted in the formation of the Dominion.

Since the confederation of the provinces, the chief events have been as follows: The Red River Rebellion, which collapsed in August, 1870; treaty of Washington, 1871, dealing with fisheries and the mutual use of certain canals; outbreak of half-breeds under Louis Riel in March, 1885, resulting in the speedy suppression of the rebellion and Riel's execution; and the treaty for the settlement of the fisheries dispute, signed by the British and United States representatives February 15, 1888. Sir John MacDonald died June 7, 1891, his funeral being attended by a vast concourse of people. In October the Dominion Government refused to acquiesce in the copyright treaty between England and the United States, claiming that the treaty was not international.



PARLIAMENT HOUSE, OTTAWA.

The voting in Ontario on the Prohibition Plebiscite resulted in a prohibition majority of 81,769. This was in 1894 and shows the widespread agitation at this time upon the question of temperance. Charges of bribery and corruption were made in Newfoundland during the same year and the ministry was compelled to resign, April 11. Much excitement was caused throughout the country on account of the Manitoba school question involving the sectarian issue; judgment was pronounced in favor of the minority, February 6, 1895. This was followed by a remedial order which was adopted by the Cabinet Council, March 19.

After a heated campaign the New Brunswick elections resulted in a complete victory for the government, by a vote of 35 to 8, October 17, 1895. Canada exports chiefly coal, gold, copper, iron, phosphates, salt, mineral oils and gypsum. Gold mines are worked in Nova Scotia and other parts of the country. The fisheries, as regards the area of water available, are the largest in the world. A bounty is offered by the government for the vessels making the largest catch. The canal and river improvements have cost large sums of money and are works of great utility and importance. English is generally spoken in the Dominion, but in some parts of the province of Quebec

French is the only language understood. In the Dominion, Quebec and Manitoba Parliaments, members may address the House in either language. In Quebec prov ince the speeches are usually in French, whic seems to retain a strong hold upon the peopl

MEXICO

WHEN the Spaniards, under Cortez, commenced the conquest of Mexico in 1519, they found the native Indians far advanced in civilization, wealthy and hospitable. They had some knowledge of art and architecture, and some ideas of civilized life. They had an instinctive dread of the foreigners, and yet treated them with kindness. The country continued under the jurisdiction of a Spanish viceroy, until it declared itself independent in 1820, and ha so continued to the present time.

ENTRY OF THE FRENCH INTO THE CITY OF MEXICO.

In 1825 a treaty of commerce was forme with Great Britain. The expulsion of th Spaniards was decreed in 1829, and a Spanish expedition against Mexico was unsuccessful. On the 11th of May, 1833, after a revolution such as have been common in Mexico, Santa Ann was made President. This resulted in the independence of Mexico, which was recognized by Brazil in 1830 and by Spain in 1836.

In 1845 occurred the war between Mexico and the United States respecting the possession of Texas, and the Americans having been victorious, a treaty of peace was ratified May 19, 1848. Since this time there has been no rupture of peaceful relations between the two countries.

In 1863 an assembly of notables at the city of Mexico decided on the establishment of a limited hereditary monarchy, with a Roman Catholic Prince as Emperor, and offered the crown to the Achduke Maximilian of Austria. The attempt, aided by the French, proved unsuccessful, and after a condition amounting to civil war, the Republican element of Mexico was successful, and Maximilian was seized and shot, June 19, 1867. The city of Mexico which was held by the monarchial party was taken by the opposing forces after a siege of sixty-seven days, and the Republic was re-established.

During the same year the Mexican Congress assembled, Jaurez acting as provisional president; he was re-elected in December of the same year. A series of insurrections followed through the efforts of different parties to obtain control of the government. The insurgent Diaz defeated the government troops, entered the city of Mexico and assumed power as provisional president in November, 1876. Diaz retained the presidency of the Republic, and continued his administration.

Mexico is rich in mines and is a large exporter of coffee and tobacco. In addition to these, the chief agricultural products are maize, barley, wheat, beans, cotton, sugar cane, rice, cocoa and vanilla. Large numbers of cattle are reared in Mexico for the United States and other countries.

ENGLAND

IT is a well-known fact of history that the western part of England was known to the Phœnicians, and was resorted to by them for its tin, about four centuries B. C.; hence the whole country received the name of the *Cassiterrides* ("Tin Islands"). When invaded by Cæsar, B. C. 55, it was called *Britain*, or sometimes *Albion*. The Romans subdued all England, and some parts of Scotland and Wales, but did not reach Ireland, though its existence was known to them.

In the third century of the Christian era, adventurers from the opposite coasts of Germany settled in various parts, and joined with the Britons in forcing the Romans to abandon the Island, A. D. 410, after a rule of about 400 years, traces of which still remain in every quarter. The Britons, being divided into as many hostile states as they had cities, were unable to resist the fresh hordes (now called *Saxons* and *Angles*) that poured into the island, and about 459 the kingdom of Kent was founded.

The Britons still fought stubbornly, but were gradually driven westward, and by the year 584 the kingdom of Mercia was established, being the last of the seven kingdoms founded by the invaders, whence the name of the *Heptarchy*. In 827, Egbert, king of Wessex, obtained the supremacy over his rivals, and declared himself King of England.

BATTLE OF HASTINGS—DEATH OF HAROLD.

His descendants, of whom Alfred the Great was the most illustrious, held the throne for more than 200 years, but the country suffered greatly during the time from the ravages of the Danes, who, under Canute and his sons, became its ruler for 25 years (1017–1042). The Saxon line was restored in the person of Edward the Confessor, to whom Harold succeeded; but his death in the battle of Hastings, 1066, gave England into the hands of the Norman kings, who reigned from 1066 to 1154.

Then came the Plantagenets (1154–1485); the Tudors (1485–1603); and the Stuarts (1603–1714), to whom the House of Brunswick succeeded on the death of Queen Anne. The conquest of Ireland was begun in the year 1170, but can hardly be regarded as completed till the surrender of Limerick in 1691. Wales was conquered by Edward I. in 1282, and formally annexed to England by Henry VIII. in 1536.

Alliance with France.

Scotland successfully resisted the efforts of Edward I. to subjugate it, maintained for ages a close alliance with France, and in 1603 gave a ruler to England in the person of James VI., who became James I. of Great Britain, a title then first assumed. This was but a personal union, but the political union of the two kingdoms was effected under Queen Anne in 1707. Ireland which had been hitherto only styled a lordship, was declared a kingdom in 1542, and this kingdom declared a member of the triple monarchy of Great Britain and Ireland by the Act of Union, 1801.

Early in the present century there was a determined and successful effort by the Irish Catholics to obtain religious emancipation. At length the leaders of the Whig party made common cause with the classes hitherto excluded from government, and backed at once by the traders and artisans, forced upon an unwilling Parliament the Great Reform Bill of 1832, which marked an important epoch in English history.

From this time there has been a marked change both in the position of England and in the character of the questions which have excited public interest. Still mistress of the sea, and possessed through its colonies of an empire distributed in every corner of the globe, England has found enough to do in the preservation and improvement of this gigantic dominion, and has as far as possible abstained from interference in continental quarrels.

Vast Power and Influence.

Once and again it has shown its influence. In 1848, the year of revolutions, and in the subsequent consolidation of Italy, its sympathies were not hidden, but there was no thought of active interference. It allowed the great American Republic to settle its disputes uninterrupted, save by sympathy at first shown to the South. It adopted the same attitude of non-intervention in the Prussian wars against Denmark, against Austria and against France. It has only been in questions which seemed to touch the safety of its eastern empire that it has drawn the sword.

The Crimean War was avowedly for the maintenance of Turkey as a check upon Russia, which was threatening the road to India. Of the same class have been the wars in Egypt and Afghanistan. Still more directly when India itself burst into insurrection was England called upon to interfere and engage in the victorious but terrible campaigns which marked the suppression of the mutiny. The other wars, and they are not few, have all been connected with mercantile and colonial interests. The questions which have chiefly moved men's minds have been of a social or mercantile character.

The extension of the electoral franchise, the reform of municipalities, the repeal of the corn laws, the establishment of free trade, the improvement of the condition of the working classes, the regulation of strikes and trades-unions, a national system of education, and of late years the question of the managment of Ireland, have been the points round which political interest has centred. They are the fitting questions to occupy a democracy. To that phase of political life in one way or other England is fast hastening.

It has still to be seen whether under such conditions means will be found to keep together those colonies which are already to all intents and purposes independent, and to preserve to the empire the magnificent position which the gradual development of physical and political forces has secured.

Table of Kings and Queens of England.

NORMAN LINE.

	Began to Reign.
William I	October 14, 1066
William II	September 9, 1087
Henry I	August 2, 1100
Stephen	December 2, 1135

FAMILY OF PLANTAGENET.

Henry II	October 25, 1154
Richard I	July 6, 1189
John	April 6, 1199
Henry III	October 19, 1216
Edward I	November 16, 1272
Edward II	July 7, 1307
Edward III	January 24, 1326
Richard II	June 21, 1377

HOUSE OF LANCASTER.

Henry IV	September 29, 1399
Henry V	March 23, 1413
Henry VI	August 31, 1422

HOUSE OF YORK.

Edward IV	March 1, 1461
Edward V	April 9, 1483
Richard III	June 22, 1483

YORK AND LANCASTER UNITED IN THE HOUSE OF TUDOR.

Henry VII. of Lan	August 22, 1485
Henry VIII	April 22, 1509

Edward VI	January 28, 1547
Mary I	July 6, 1553
Elizabeth	November 17, 1558

HOUSE OF STUART.

James I	March 24, 1603
Charles I	March 27, 1625
Cromwell, Protector	From 1649 to 1660
Charles II	January 30, 1660
James II	February 6, 1685
William and Mary	February 13, 1689
William alone	from December 28, 1694
Anne	March 8, 1702

BRUNSWICK FAMILY.

George I	August 1, 1714
George II	June 11, 1727
George III	October 25, 1760
George IV	January 29, 1820
William IV	June 26, 1830
Victoria	June 20, 1837
Edward VII	January 22, 1901

SCOTLAND

FROM historic records it appears that the first inhabitants of Scotland were Celts, and probably were the same as the early Britons, Welsh and Irish. They defended themselves against the Romans, who could never subdue the people of the Highlands. They were so troublesome that the Roman generals caused a wall to be built from the Solway Firth to the river Tyne.

Thus the Scots were shut up in their own country, like a herd of unruly cattle; but they contrived to get over the wall pretty often. In three or four hundred years after Christ a tribe of Goths, called Picts, came over from the continent and settled in the country. These inhabited the Lowlands, and lived by agriculture. The Scots dwelt in the mountains, carrying on war, and subsisting by the chase.

Thus the nation become divided into Highlanders and Lowlanders, and thus, to some extent, the people remain to this day. They live peaceably now, but in early days they quarreled fiercely. In 839, it is said that Kenneth II., who was a Highland leader, subdued the Picts, and became first king of all Scotland. From this time to Edward I. of England, there was a constant change of sovereigns. Edward Longshanks, the same that subdued Wales, made war upon the Scotch, imprisoned Wallace, and had prepared a great army for the final subjugation of Scotland, when he died. Edward II., was beaten by Robert Bruce at the glorious battle of Bannockburn. This event occurred in 1313, and secured the freedom of Scotland, which had been threatened by the English kings.

Incessant Warfare.

From this time the history of Scotland tells of little but civil wars and bloody battles with England, till the time of James V. He assumed the reins of government in 1513, at the age of eighteen months. He afterwards lost the confidence of his army, and they deserted him in the hour of need. This broke his heart, and he starved himself to death in 1542 at the age of thirty-one.

His daughter was the beautiful and unfortunate Mary Queen of Scots, as she is called, and who was educated in France, and was not only very handsome, but very accomplished. While she was yet a young lady she was taken to Scotland and became queen. But beauty, accomplishments and power, cannot insure happiness. Mary's kingdom was in a state of great trouble; the people were divided among themselves, and Mary found it impossible to govern them. At length she became afraid that they would kill her, and, to save her life, she went to England and placed herself under the protection of Elizabeth, who caused her to be put in prison, and finally took her life, thus ending her many misfortunes.

The son of Mary, James VI. of Scotland, succeeded his mother, and after the death of Elizabeth he became King of England also, under the title of James I. Though he lived in England he did not forget Scotland. He loved learning and caused schools to be established in his native country. These schools are continued to this day, and therefore it is very uncommon to meet with a Scotchman who is wholly uneducated.

From the time of King James, in 1603, Scotland has been attached to the British crown. She has sometimes rebelled, and in the cause of the Stuarts she fought a good many battles. But Scotland has long been a peaceful portion of the British kingdom.

IRELAND

THE origin of the ancient Irish race is involved in much obscurity; ethnologists, however, generally agree in describing it as belonging to the old Brito-Celtic stock. Under the name of *Scoti*, they became known to the Romans by their incursions upon Britain. In the third century A. D., through the supposed influence of St. Patrick, the natives of the island became Christianized, and by the sixth, learning and civilization had become largely diffused throughout its limits.

In 1014 A. D., the Danish invaders were overthrown by King Brian Boru in the battle of Clontarf. In 1155, Pope Adrian IV. granted Ireland, by special bull, to Henry II. of England, and the island received shortly afterward a permanent English colonization. In 1210 King John granted a Charter to the Irish, which received confirmation at the hands of his son, Henry III.

In the sixteenth century, Henry VIII. introduced the Reformed Faith, and assumed the title of *King of Ireland.* Under James I. the province of Ulster received a large immigration of Scottish and English settlers, who introduced Presbyterianism. In 1641, the Catholic population raised a formidable revolt against the English Protestants, 40,000 of whom were killed in Ulster alone.

Anarchy continued to prevail till 1649, when the English republican, Cromwell, crushed it out with a hand of iron. In 1688, the Irish people—except the Ulster Protestants—espoused the cause of James II.—a cause extinguished by the defeats of Boyne and Aughrim.

In 1798, the Irish Catholics again rose in revolt, and received some trifling aid from France; this insurrection ended in their being more firmly riveted to England than before. In 1800, the Irish Parliament voted the legislative union of Ireland with England; in 1829, the Catholic Emancipation Bill passed the Imperial Parliament; in 1848, a so-called "manifesto" of the "Young Ireland party" provoked an unsuccessful attempt at insurrection under William Smith O'Brien and others; and since then the *Fenians*, *Home Rulers*, *Land Leaguers* and other modern partisans of Irish Independence have been a cause of anxiety and trouble to the British Government.

The government is semi-independent, an English viceroy, under the title of *Lord Lieutenant*, holding almost regal sway. The Roman Catholic is the prevailing form of religion, excepting in Ulster, in which province Presbyterianism is largely in the ascendant. In 1870, the Anglican Church in Ireland, heretofore based on a similar foundation to that which it holds in the sister-kingdom, was disestablished by Act of Parliament, and all churches therefore made self-supporting.

Ireland is well supplied with educational institutions, having three universities—those of Trinity College, Dublin (Protestant), Maynooth (Roman Catholic), and the Queen's University—besides a large number of endowed schools, and an admirable system of mixed schools where children of all denominations may be taught. The legal executive is similar to that of England.

FRANCE

BEFORE the time of Cæsar, the whole of France was known to the Romans under the name of *Transalpine Gaul;* but after its conquest it was divided into the four provinces of *Provincia Romanorum* (Provence), *Gallia, Aquitanica*, *Celtica* and *Belgica*. In the fifth century the Germanic nations began to pour in an irresistible torrent over Gaul; but the Franks, in course of time, absorbed all the other tribes of that country, and Pharamond, their chief, in 420, is considered the founder of the French monarchy.

In 751 the Carlovingian dynasty, commenced in the person of Pepin le Bref, was carried to the zenith of its power and glory by Charlemagne, 768-814, and ended with Louis V. in 987. The Capetian race gave fifteen kings to France, beginning with Hugh Capet and ending with Charles V., 1328.

The house of Valois ruled France under thirteen kings, beginning with Philip VI. and ending with Henri III., 1589. In that year Henri IV. inaugurated the House of Bourbon. Louis XIII. succeeded in 1610; Louis XIV. in 1643; Louis XV. in 1715; and Louis XVI. in 1774.

In 1789, broke out that tremendous revolution which cost Louis XVI. his crown and head (1793), destroyed every vestige of the previous government and institutions, and inaugurated an era of periodical convulsions, which, unhappily for this country does not yet seem to have terminated.

Downfall of Napoleon.

The power was successively held by the Convention, 1792; the Directory, 1795; the Consulate, 1799; Napoleon I., who caused himself to be crowned emperor, 1804, and whose downfall dates from the great battle of Waterloo, 1815; Louis XVIII., the representative of the House of Bourbon, who was then restored to the throne by the aid of the Allied Powers; Charles X., who succeeded the latter in 1824; Louis Philippe I., of the Orleans branch of the Bourbons, who was raised to the throne after the revolution of July, 1830; the Second Republic, inaugurated after the overthrow of the last-named monarch in 1848; and Napoleon III., who, after the *coup d'etat* of 1851, was elected emperor.

In July, 1870, the latter declared war against Prussia; his armies were defeated in several battles, and himself compelled to surrender to the victorious enemy after the decisive battle gained by them before Sedan in September; and his dethronement was decreed by the French Assembly. The war was then unsuccessfully renewed by the Republican Government of National Defence; Paris, besieged by the Germans, resisted heroically its invaders for several months, but on the eve of being obliged to capitulate by sheer starvation, negotiations were entered into which resulted, in February, 1871, in a disastrous treaty of peace with Germany, by which France lost the portions of her territory included in Alsace-Lorraine, and had also to pay the enormous sum of $1,000,000,000 by way of indemnity, which indemnity, however, was paid in full much in advance of the stipulated period.

In March, 1871, a revolt broke out in Paris, headed by the leaders of the extreme Republican party, in conjunction with the Socialists. Under the name of the *Commune*, they inaugurated a dictatorial power in the French capital, and resisted the authority of the National Assembly; hence necessitating a second siege, more calamitous than the first

Presidents of the Republic.

On August 31, 1871, M. Louis Adolphe Thiers was nominated by the National Assembly President of the French Republic. In 1873 (May 24) he was succeeded by Marshal MacMahon, and in 1879 by M. Grévy, who resigned in 1887, and was succeeded by M. Carnot.

On the 23d of June, 1894, President Carnot was assassinated at Lyons by an Anarchist. M. Cassimer Perier was elected President June 27th by the National Assembly. In January, 1895, he resigned his office and determined to retire to private life. On the 17th of the same month the Assembly elected as his successor, M. François Felix Faure.

France is notably an agricultural country. The high development of nursery-gardening has achieved most remarkable results in variety and richness of crops. It may suffice to say that, owing to their perfect methods of horticulture, the farmers around Paris and other large cities succeed in obtaining vegetables and fruit to the value of from $300 to $800 per acre. The planting of trees and the reclamation of unproductive soil go on in various parts of France on a large scale. Special interest is taken in cattle-raising, and fine breeds of horses are reared in the North and Northwest. In some parts of the country wool-growing is an extensive industry. The exports of cattle, butter, eggs, cheese and poultry, especially to England, are very considerable—no less than 70,000,000 pounds of butter and 1,000,000,000 eggs being sent every year across the channel.

France is very rich in all kinds of building stone, gravel, chalk and plaster, and this circumstance has permitted her to build most of her cities of excellent stone.

THE GERMAN EMPIRE

FROM all that can be collected of the early history of Germany (called *Germania* by the Romans), it appears to have been divided into many petty nations and principalities, many of which frequently united under one head or general, both in their offensive and defensive wars. The Germans maintained a long and aggressive warfare against the Romans, but were at length kept in check by Germanicus.

The Romans, nevertheless, prudently contented themselves by making the Rhine and the Danube the boundaries of their conquests; they accordingly built fortresses on the banks of both those rivers, to prevent the incursions of what they termed the barbarous nations; but within about a century after Constantine the Great, the Franks, Burgundians, Alemanni, and other German nations, broke through those boundaries, and dispossessed the Romans of all Gaul, Rhætia and Noricum, which they shared among themselves; but the Franks prevailing over the rest, at length established their empire over all modern Germany, France and Italy, under the conduct of Charlemagne.

At the demise of this great monarch, Germany became again dissolved into constituent states until 843, when the kingdom of Germany arose under the sovereignty of Louis le Debonnaire. After being governed by the Carlovingians till 887, the monarchy became elective in 911, in the person of Conrad I., Duke of Franconia; a Saxon dynasty succeeded in 918, and afterward resuscitated the empire under Otho the Great, under the title of the *Holy Roman Empire of the German Nation.*

The Throne at Last Established.

Under the Suabian dynasty, 1138-1190, the imperial power attained its zenith. Then came the aggressions of the Popes, the feuds of the great vassals of the crown, and the state of anarchy consequent upon the struggle between the Guelphs and the Ghibellines, succeeded by an interregnum lasting from 1254 to 1273. In the latter year the empire became reconsolidated by Rudolph of Hapsburg, and the throne first placed upon a firm basis.

In 1438, the House of Austria commenced its long career as Emperor of Germany, and reached its acme of power and prosperity under Charles V. and his immediate successors. The Thirty Years' War, 1618–48, then supervened to disintegrate the empire, establish the Lutheran religion, and give to France the political ascendancy on the continent of Europe. For several

CHARLEMAGNE AND HIS NOBLES.

after generations, wars with the last-named power culminated, in 1740, in the War of the Austrian Succession, which raised the House of Lorraine to the imperial throne in the person of Francis I.

At length, in 1804, the ancient German empire came to an end, beneath the blows of Napoleon I., by the abdication of Francis II., who, retaining only his hereditary territories, became the first Emperor of Austria. Ages anterior to this consummation, Germany had been politically transformed (so to speak) by the great princes, vassals of the empire, into a semi-independent confederacy of petty states, represented in the diets. The free cities also shared in the distribution of political power, and finally resolved themselves into the Hanseatic League.

The Historic Ten Circles.

Prior to the French Revolution, 1789, the empire had become politically distributed into ten *circles*, each circle embracing the states of one or more powers—regal, ducal, electoral, ecclesiastical or municipal. The provincial diets of these circles were subject (at all events nominally) to the imperial diet convened and presided over by the emperors.

In 1805, Napoleon I., in pursuance of his designs for the disintegration of the German power as a unity, enlisted on his side certain of the circles and electoral powers, which he combined into a body called the *Confederation of the Rhine*. He also created for his brother Joseph a kingdom out of the Lower Rhine provinces, under the name of Westphalia. In 1809, too, he succeeded in absorbing into the French Empire the seaboard provinces of the old regime, and divided them into departments after the French manner. In 1813, however, the *Liberation War* broke out, and terminated in the redemption of the country, and the expulsion of the foreign invaders.

The Congress of Vienna, 1815, divide Germany into thirty-nine sovereign states which number became by various after cause reduced to thirty-four, at which it stood prio to the Austro-Prussian war of 1866, whic eliminated Hanover and several other secondary states from the German political map and extinguished Austrian influence in Germany proper. Prussia hence became th one recognized ruling power in tha country, and assumed the leadership o the states of North Germany, united unde the title of the *North German Confederation*

Grand Military Alliance.

In addition, she further increased her political influence, or rather preponderance, by entering into treaties with the South German powers of Bavaria, Würtemberg an Baden, providing for a strict internationa military alliance—offensive and defensive— and the placing of the armies of those power at the disposal of the German nation, as represented by Prussia, in time of war. Th practical results of this wise and astute polic bore fruit in the achievements of the unite German armies in the campaign agains France, 1870–1: and the restoration o national unity, in the rehabilitation of the Germanic Empire of Barbarossa and Charles V. in the person of William I., King of Prussia.

In 1888, a serious illness of Emperor William resulted fatally, March 9th, and his son, Prince Frederick III., came to the throne. His death followed on June 15th, and he was succeeded by his son, Emperor William II. On April 24, 1895, the German Government, in connection with Russia and France, protested against the acquisition of Chinese territory by Japan. On June 19th, the opening of the Baltic Canal was celebrated by the Germans with the warships of all maritime nations as guests. The occasion called forth congratulations for Germany from many other governments whose representatives participated in the festivities, and was regarded as a peaceful demonstration intended to afford opportunity for the European nations to express their good will.

AUSTRO-HUNGARIAN EMPIRE

TOWARDS the close of the 8th century the Emperor Charlemagne founded a jurisdiction in Lower Austria, which became a duchy in 1156 and an arch-duchy 300 years later. In 1564, Maximillian II., son of the great Emperor Charles V., became Emperor, with Austria, Hungary and Bohemia for his possessions. But many years elapsed before the whole of Austria was united under one government.

In the 18th century it attained rank as one of the great powers of Europe, and up to a recent date its influence was all-powerful in Germany. Until 1806 its rulers bore the itle of Emperor of the Romans, but in that year the Emperor Francis renounced that itle and became the first Emperor of Ausria. From 1806 to 1813 Austria was menaced by the ambitious Napoleon, but made such bitter armed patriotic resistance to the nroads of this almost invincible warrior, that he French victories were shorn of much of heir glory. The peace of Vienna (October 4, 1809) took from Austria large possesions.

But these were restored by the Congress of Vienna (1815) after the defeat of Napoleon t Waterloo, together with Lombardy and Venice, the Illyrian provinces, Dalmatia and he Tyrol. The close of the reign of Francis I. was marked by several insurrections amongst the Italian provinces, and it was with the utmost difficulty that the confederation was maintained. The Emperor died in 1835, and was succeeded by his son, Ferdinand I., a weak-minded prince, who entrusted the government almost entirely to Metternich. The French Revolution (1848) caused the Austrian Empire to totter to its foundations. The revolutionary spirit manifested itself everywhere, resulting in the abdication of the Emperor in December, and the imperial honors were conferred upon his nephew, Francis Joseph.

The Two Months' War.

In 1859 diplomatic complications led to a rupture of relations with France, which was followed by warfare, for two months, until in July the two Emperors, Napoleon III. and Francis Joseph, consummated the peace of Villafranca, Austria giving up Lombardy, Italy to be formed into a confederation under the presidency of the Pope, and Modena and Tuscany to be restored to their princes. The first constitution of Austria was promulgated in 1860, followed by a patent in 1861, which formed the basis of a charter that went into effect in 1867, with certain modifications rendered necessary by the recognition of Hungary's independence. In 1864 Austria joined Prussia in hostilities upon the Danish duchies of Schleswig, Holstein and Lauenburg, and the war terminated in their acquisition.

But Austria speedily suffered terrible retribution for the part she had taken in the affair, the difficulty in disposition of the provinces bringing on war with her former ally. The Italians acted in concert with Prussia in hostilities upon Austria, and what is called the Seven Days' War ended in the Prussian victory at Königgratz, which led to peace negotiations at Prague, where a treaty was signed August 23d.

By this treaty Austria was shorn of Venetia and the fortresses of the quadrilateral, the dissolution of the German Confederation was recognized, all claim to Holstein an Schleswig was given up, and an indemnit of 20,000,000 thalers paid. Home affair then claimed the attention of the Emperor The necessity of self-government for Hungar was recognized, and on June 8, 1867,Franci Joseph was crowned King of Hungary, i addition to his title as Emperor of Austria.

A treaty of alliance with Germany an Italy was signed March 13, 1887. This wa followed by a defensive treaty with German against Russian or other aggressions, Octobe 7, 1879. Archduke Rudolph, heir to th throne, committed suicide January 30, 188 In December, 1893, a commercial treaty wa formed with Spain.

THE RUSSIAN EMPIRE.

HISTORY records the fact that the Scythians and Sarmatians of the country bordering on the Don and Dnieper, were known to the Greeks and Romans of old, as they are mentioned hy Herodotus, Strabo and Tacitus. In the earlier centuries of the Christian era successive invasions of Goths, Huns, and other warlike peoples swept over the land, and either drove out or absorbed the native inhabitants. At this point we find the first mention of the Slavs, who drove the scattered Finnish tribes to the far north and became the founders of the Russian people and government. There stands in Novgorod a splendid monument which was erected in 1862 on the millennial anniversary of the foundation of the Russian Empire by Ruric the Norman.

But for many centuries the country wa divided into practically independent provinces some of which retained their autonomy u to a very recent period. The empire wa divided and again united; it was broken int four parts; became a confederacy, and again under Ivan III. (1462–1505), became nation.

Christianity was introduced about the yea 950, and two centuries later the greate part of the empire was overrun by the Mongols. From 1380 to 1470 tribute was pai to the Tartars, but Ivan the Great brok their power and his son and successor, Iva the Terrible, contributed much to the greatness of Russia.

Under Peter the Great, the fourth monarc of the Romanoff dynasty, Russia emerge from barbarism, the boyars (noblemen lost their influence, and the country assume

CATHARINE THE GREAT AT THE HEAD OF HER ARMY.

the position which it has ever since retained as a leading member of the European family of nations. Since the time of Peter its national policy has been directed to the acquirement of additional European and Asiatic territory, and every reign has seen vast possessions added to this already enormous power.

Russia become involved in the general European wars of the first fifteen years of this century, and destroyed its most renowned city, Moscow, that it might not afford shelter to the hated invader, Napoleon. All efforts of the various nations which have at one time or another been absorbed by Russia to regain their independence have been barren of results; she never gives anything back.

Russia's Onward March.

Although her schemes of aggrandizement on the Black Sea were temporarily checked by the war of 1854–55, in which England, France and Sardinia supported the Ottoman Empire, Russia has since made greater strides east and south, and has almost attained her chief aim, the full and unrestricted control of the Black Sea. She presses England upon the line of the Himalayas, and China finds its great wall an insufficient defence against the disciplined legions of this great power.

Properly speaking, Russia is an Asiatic power with great possessions in Europe rather than a European power with subject provinces in Asia, and its march has been and continues to be in a directly opposite line to the ordinary movement of population and empire, which is westward.

There was much domestic disturbance in Russia during the years 1891 and 1892, in the former of which the country was distressed by poor harvests and famine in some localities, while in the latter year cholera carried off a quarter of a million persons. On November 1, 1894, occurred the death of Czar Alexander III. at Livadia, aged 49. Notwithstanding this recent death in the royal family, on the 26th of the same month, Czar Nicholas II. wedded the Princess Alix of Hesse-Darmstadt.

Her Power Felt Everywhere.

For a long time the influence of Russia has been paramount in the politics of eastern Europe and some parts of Asia. No sooner had Japan gained her brilliant victory over China in 1894 than the power of Russia began to manifest itself in the settlement of the terms demanded by the Japanese Government. In the early part of 1896 the same strong influence was brought to bear upon the Turkish question, which then was agitating the world on account of the Armenian Massacres, putting an effectual check upon English diplomacy.

The public income of Russia for 1895 was estimated at 1,214,378,030 roubles, having almost doubled since 1883. The internal taxes are collected in paper, but much of the customs dues are paid in gold. The value of the paper rouble is about fifty cents in our money, while the gold rouble is valued at about seventy-seven cents. But as only about one-tenth of the revenue is from customs, it is safe to put the yearly income of the government at a little over $600,000,000.

The exports of Russia to foreign countries consist principally of corn, flour, butter, eggs, flax, timber, linseed, raw wool and illuminating oils. The chief industrial centres are Moscow and the surrounding governments, St. Petersburg and Poland. The woolen trade is taking firm root in the South, chiefly through English capital and enterprise. The domestic industries carried on along with agriculture are of great importance and a source of livelihood to vast numbers of the peasantry. The empire is very rich in all kinds of minerals, and its mining industry has of late years begun to advance with rapid strides and is full of promise.

NORWAY AND SWEDEN

NORWAY'S authentic history begins with A. D. 863–933, when Harold Harfager, or Fair-Haired, subdued the petty kings and united the tribes as a nation. Olaf I., who came to the throne in 995, destroyed the pagen temples, and laid the foundation of Trondhjem. In 1028 Canute the Great, of Denmark and England, drove Olaf out and became King. Then commenced a series of wars with Britain, followed by an invasion of Ireland. A warlike nation, they became noted for their prowess by water, and were a terror to the nations about them.

In 1262 the national prosperity of Norway began to decline after the defeat of Haco V. at the mouth of the Clyde, and his subsequent death in the Orkneys. Wars with Denmark exhausted the country's resources, national industries were checked, and the plague broke out in 1348 and ravaged the kingdom for more than two years, destroying two-thirds of the population. Centuries elapsed before this condition of decay was thrown off. The country not only lost its nationalty, but also its proper language, which finally became a corrupt mixture of those of its neighbors.

In 1380 the crown descended to the son of Olaf III., King of Denmark, and from that period down to 1814 these two countries were united. Margaret succeeded her son, Olaf III., reduced Sweden, and joined the three kingdoms under one monarch, under what is historically known as the "Union of Calmar." Gustavus Vasa severed this union with Sweden in 1523, and for two centuries Norway was scarcely more than a province of Denmark. About the beginning of the present century a better day dawned on Norway.

Union of the Two Countries.

After a series of dissensions and diplomatic complications, Russia, which had been engaged in warfare with Napoleon, indemnified Sweden for the loss of Finland—which on a former occasion Napoleon had signed away to Russia, without warrant—by the presentation of Norway, to which Sweden had no title. In 1814 the Danes acknowledged Norway as a dominion of Charles XIII. of Sweden, but a Danish prince, Christian, attempted to set up an independent sovereignity, but was compelled to abdicate, and on August 14th of the same year, Norway and Sweden were formally united, the ratification by the Storthing settling the matter on the 20th of October.

From this time the government became more and more liberal, titles of nobility were abolished, and the people styled citizens. In

1855 there was a good deal of anxiety felt over the encroachments of the Russian Government, and Norway, Sweden, England and France entered into an alliance in which "the two Scandinavian powers promised never to cede or sell territory to Russia, or to any other power, without the consent of England and France," and by this they received a guarantee of future territorial integrity under protection of the last named powers.

The modern history of Sweden follows somewhat in the pathway of its neighboring kingdom, Norway. After the establishment of the "Union of Calmar" (1397) by Margaret of Denmark, the three countries of Norway, Sweden and Denmark were kept together with great difficulty for 100 years. In 1520, Christian II. of Denmark became King, and so exasperated the people that they rose in revolt, with Gustavus Vasa at their head and their resistance to the government of the Danish King was so successful that, i 1523, Gustavus was made King of Sweden.

The country entered on an era of prosperity, and was governed in a manner mor pleasing to the people, though the successor of Vasa attempted some radical change which did not meet with general favor. Th reigns of the sovereigns from 1600 wer marked with almost constant warfare agains adjoining kingdoms.

In 1741 Sweden was defeated in a wa with Russia, and in 1743 East Finland wa yielded to the conqueror. Following this came a war with Prussia which was disastrous in the extreme. Again in 1787 Swede was involved in a war with Russia and Denmark. In 1809 a new constitution wa decreed. During the Crimean War neithe Norway nor Sweden took any part therei Of late years Sweden has prospered an made great improvement in manufactures arts and sciences.

DENMARK

DENMARK has always exerted an influence in the affairs of Europe out of proportion to her size and military strength. Her authentic history dates from 1385, the year of the accession of Margaret, the "Semiramis of the North," and wearer of the triple Scandinavian crowns. After her glorious reign, Sweden, after a lengthened contest, succeeded in asserting her independence.

In 1658 Denmark was invaded and despoiled of some of her most important territories by the "Lion of the North," Gustavus Adolphus. In 1807 a British fleet unde Lord Nelson bombarded Copenhagen an destroyed the Danish navy, and in 181 Norway was transferred to Sweden, Denmar receiving in exchange the insignificant duch of Lauenburg, with a money indemnity; work of spoliation consummated in 1864 by the forcible acquisition of the Schleswig Holstein duchies by Prussia, after a short bu sanguinary struggle, in which the latte power, with the aid of Austria, overcame th brave Danes by sheer force of numbers.

In 1863 died Frederick VII., the las monarch of the House of Oldenburg, wh was succeeded by the present King, Christia

IV., of Schleswig-Holstein-Sonderburg-Glücksburg.

The peaceful relations already existing between Denmark and England were confirmed by the marriage of Princess Alexandra of Denmark to the Prince of Wales, at Windsor, March 10, 1863.

When the war broke out between Austria and Prussia, in 1866, and resulted in the humiliation of Austria, the hope of Denmark that a part of her original territory, which, as already stated, had been acquired by Prussia, was frustrated. Notwithstanding her dismemberment, Denmark has prospered to an astonishing degree, and her material fortunes have been constantly in the ascendant. Her only trouble within the last decade has arisen from the dissensions in the two houses of Assembly and in the spread of dangerous communistic opinions.

The Government of Denmark is a constitutional monarchy, the King being assisted by a cabinet of seven ministers. Elementary education is widely diffused and attendance at school is compulsory for children between the ages of seven and fourteen years, poor parents paying only a nominal sum toward the government schools, of which there are about three thousand. The established religion is Lutheran, to which the King must belong, but complete toleration is enjoyed in every part of the kingdom. The present King of Greece is a prince of the royal house of Denmark.

HOLLAND—THE NETHERLANDS

BY the revolution of 1830, Holland, or the Netherlands, was separated from Belgium. The earliest accounts of the Netherlands are from the Romans, by whom all the southern and central part (called Belgia) was kept in subjection till the decline of their empire in the fifth century. It was formerly under the government of counts, but being incorporated with the extensive possessions of the Duke of Burgundy, the Netherlands passed to Maximilian of Austria, father of Charles V., who united the seventeen provinces into one state; but the bigotry of his son Philip II. produced the separation of the Dutch provinces, and great dissension and distress in the others.

They remained under the Spanish crown until the middle of the seventeenth century, when arduous exertions were made by Condé and Turenne to add them to the dominions of Louis XIV. The quadruple alliance, concluded at the Hague in 1668, however, put a stop to their progress, but the wars from 1672 to 1679, and 1680 to 1697, were prosecuted chiefly for the Netherlands. At length, in 1702, Louis obtained them, but the French being defeated by the Duke of Marlborough at the battle of Ramilies, in 1706, the southern provinces were brought under the power of the allies, and assigned to Austria at the peace of Utrecht.

A peace ensued, until the war of 1741 was transferred to the Netherlands, and the French under Marshal Saxe recovered them.

Bergen-op-Zoom was captured by the French in September, 1747, and Maestricht in the following year, when the successes of the British navy, and the persevering aspect of the coalition, led to the peace of Aix-la-Chapelle in 1748, and the southern Netherlands thus became restored to Austria. By the treachery of Austria in 1756 they were once more nearly ceded to France, but the scheme was not carried into effect.

In the campaign of 1792 Austria again lost the Netherlands, and though recovered in 1793, they again passed over to France in 1794. The hope of recovering them was the cause of the coalition of 1799 and 1805, both baffled in their object. The disasters of the French army in Russia in 1812, at length opened the long-wished-for prospect. In 1813 Germany occupied all the exertions of the allies, but in 1814 the Netherlands were detached by a consequence of the revolution by which the Bourbons were restored; and the British Cabinet accomplished the union of the seventeen provinces, and their erection into an independent state, under the Prince of Orange, in 1815. The Prince, therefore assumed the title of King of the Netherland and Grand Duke of Luxembourg.

VIEW OF DORT.

The bill for the emancipation of the slave in the Dutch West Indian possessions, passe in 1862, decreed a compensation for eac slave and came into force in 1863. The expenses of this emancipation came to $5,065,366, and the number of slaves set free wa about 42,000, of whom 35,000 were i Dutch Guiana.

The present King having no living mal issue, the succession to th crown was vested in the Princess of Orange, Wilhelmina the only child of King William's second marriage, bor in 1880. Of late years th great question of interna politics has been the new constitution, which was duly promulgated November 30, 1887 This act increased the electorate of Holland by no les than 200,000 voters. A revision of the school laws in sectarian sense was carrie early in December, 1889 Meanwhile, in 1888, th Queen, Emma of Waldeck had been appointed regent in the event o the King's demise, and a council of guardians named to assist her in the education o Princess Wilhelmina.

Many industries are carried on, and th country has a large percentage of skille artisans. Amsterdam has had the larges diamond-cutting trade in the world, te thousand persons depending on that branc of industry, although in recent years it ha been on the decline.

The Dutch were once called the "Carrier of Europe." While this designation doe not apply to them now, they still have a large mercantile marine. Minerals are scarce in the Netherlands, but valuable clay, for the manufacture of tiles, bricks and pottery is found everywhere in great abundance, and of late there has been somewhat of a revival of the Delft-ware, which was formerly so famous.

BELGIUM

IN the time of the Romans, Belgium was included in Gaul, and was known as *Gallia Belgica*. The people were mostly Celts, but while under the rule of the Franks, in the 5th and 6th centuries, by irruptions from the North the principal element of the population became German.

The country was afterwards divided into a number of independent duchies, counties and free cities, the principal of which was the County of Flanders. The male line of the Counts of Flanders became extinct in 1385, and their possessions passed into the hands of the Dukes of Burgundy, who soon after obtained the whole of the Netherlands.

By the marriage of Mary of Burgundy with Maximilian in 1477, the Netherlands came into possession of Austria. Maximilian was succeeded by his son Philip, who married Johanna, daughter of Ferdinand and Isabella of Spain, in 1496.

Holland, the northern portion of the Netherlands, established its independence, while the southern portion, Belgium, continued under the rule of Spain, Philip ceded Belgium to his daughter, Isabella, and her husband, the Archduke Albert, in 1598, under whom it formed a distinct and independent kingdom. Albert died in 1621 without issue, and the country again fell into the hands of Spain.

Between 1659 and 1697 Belgium lost considerable territory in the wars between Spain and France and Holland. By the treaty of Utrecht in 1713, Belgium was assigned to Austria. During the war of the Austrian succession almost the whole country fell into the hands of the French, but by the peace of Aix-la-Chapelle it was restored to Austria, 1748. In 1790 the provinces of Belgium revolted against Austrian rule, and formed themselves into an independent state under the name of United Belgium. They were, however, subdued by the Austrians in the end of the same year.

Austria's Power Overthrown.

In the war with revolutionary France the battle of Fleurus (1794) put an end to the Austrian rule in Belgium. In 1815 it was united with Holland under Prince William Frederick of Nassau. Belgium revolted in 1830, declared itself an independent state, and chose Leopold, Prince of Saxe-Coburg, as its king, in 1831. The five great powers afterward determined the limits of the territory, making Holland and Belgium separate kingdoms. Leopold died in 1865, and was succeeded by his son, Leopold II., the present monarch.

On the outbreak of the Franco-German war in 1870 the Belgians, fearing risks both from Prussia and from France, mobilized their army; but in a special treaty arranged by England, both belligerents recognized anew the neutrality of Belgium, guaranteed in 1831 and 1839. In 1885 the Congo Free State, under the presidency of Leopold II., was acknowledged by the powers.

Although the country has, on the whole, steadily grown in prosperity, and constitutional principles have been generally strengthened, yet 1886-87 witnessed industrial riots and Socialist disturbances of a serious aspect, attended at Liege, Mons. Charleroi and other places with great violence. The King, at the opening of the Chambers in November, promised that measures of reform should be introduced, and this had the effect of quelling the disturbances. In 1880 the jubilee of the state was celebrated with enthusaism.

King Leopold has distinguished himself by being the patron of Henry M. Stanley in his African explorations, having rendered material aid to the explorer.

The government is a constitutional hereditary monarchy, the members of the House of Representatives being elected by citizens who pay not less than twenty florins annually in direct taxes. The King can convoke, adjourn or dissolve the Senate and House of Representatives at pleasure. Under the mild and successful government of Leopold, the country has prospered, and the people seem attached to their King and constitution, and are peaceful and contented

SWITZERLAND

SWITZERLAND, the ancient *Helvetia*, became, under the Roman empire, a semi-civilized country, and, after the fall of that power, passed in succession under Burgundian, Frankish and Germanic sway. In 1307 a movement of the three northern cantons of Schwyz, Uri and Unterwalden inaugurated the ultimate overthrow of Austrian rule in the result of the battle of Morgarten in 1315.

During the two following centuries the other cantons fell one by one into the arms of the Helvetic Confederation, which latter, however, did not obtain its solidarity as a European power until the peace of 1814.

In 1815 the perpetual neutrality of Switzerland and the inviolability of her territory were guaranteed by Austria, Great Britain, Portugal, Prussia and Russia, and the Federal Pact which had been drawn up at Zurich, and which included three new cantons, was accepted by the Congress of Vienna. The Pact remained in force till 1848, when a new constitution, prepared without foreign interference, was accepted by general consent. This, in turn, was, on May 29, 1874, superseded by the constitution which is now in force.

Following the new constitution of 1848 came the revolt of Neufchâtel against Prussia, to which country it had belonged, and its reception into the Swiss Confederacy as a canton on an equal footing with the rest. During the Franco-German war of 1870–71 he landwehr were called out as a measure for the maintenance of Swiss neutrality.

The sublime scenery of the Alps draws tourists to Switzerland from all parts of the world and renders this remarkable country a constant and general object of interest.

ITALY

ITALY, since the downfall of Rome, has been divided into different states, and has lost that power which it formerly enjoyed. Its historical remains, its schools of art, its delicious climate, give it an undying interest. It has been called the garden of Europe; and the panegyric which Pliny betows upon it does not seem in any degree exaggerated.

The ancient inhabitants called themselves Aborigines, offspring of the soil, and the ountry was soon after peopled by colonies from Greece. Italy has been the mother of rts as well as of arms, and the immortal monuments which remain of the eloquence nd poetical genius of its inhabitants are niversally known. The early part of the istory of this country is, however, involved in the greatest obscurity. The first light hrown on this land of darkness was by the settlement of Greek colonies in the south, where, eventually, a large tract of country was called Magna Græcia. The annals of Rome are said to go back 750 years B. C.

Italy continued subject to one power for more than 800 years; until the fifth century, when the Goths crossed the barriers of the Alps. Toward the year 560 A. D. the Lombards entered the north of Italy, took Milan and Pavia, and founded a kingdom which continued during two centuries, until overthrown by Charlemagne.

Prolonged Military Struggles.

After his death Italy belonged to his successors on the imperial throne, but their tenure was precarious, the great barons laboring to assert their independence and the popes to extend their temporal dominions. The subsequent history is little more than a succession of military struggles, of little interest, until 960, when Otho I. repaired, in person, to the north of Italy, granted municipal rights to the cities, and improved the interior government in general.

The whole was united to the German Empire; but from this compact fresh feuds and commotions followed; the Italian nobility were jealous of their privileges; conspiracies were formed, detected and suppressed, and no constant allegiance was exhibited to the German Government or the magistracy put into authority by it.

A series of wars continued for several ages. In the fourteenth century Italy was divided into the kingdom of Naples, the estates of the Church, Tuscany, Parma and Lombardy, the Genoese and the Venetian territories and other petty states. For two centuries the Venetians and the Genoese were the most considerable commercial people in Europe, and Venice, in particular, possessed large foreign colonies, and in 1194 took Constantinople and held in sovereignty portions of what now constitutes Turkey in Europe and Greece.

The foundation of the temporal power of the popes was laid about 1080, by Matilda, Countess of Tuscany, who bequeathed a large portion of her dominions to Pope Gregory VII. After that time the popes successively made great acquisitions of territory ; but in 1798 Rome was taken by Berthier, and Bonaparte annexed the papal dominions to France. They were, however, restored in 1814.

In March, 1860, Savoy and Nice were ceded to France, to which they are still attached. Garibaldi and his volunteers conquered the Two Sicilies, Francis II. of Naples fled in terror, and the end of the great popular uprising was that in March, 1861, Victor Emmanual of Sardinia was proclaimed King of Italy. The Austrians held Venice until 1866, when Italy and Prussia united their forces against her. Rome remained in the hands of the French until the outbreak of the Franco-German war, in spite of the abortive revolutions instigated by Mazzini and Garibaldi.

Finally, on September 20, 1870, the national forces entered Rome, which became at

NAPLES, SHOWING MOUNT VESUVIUS IN THE DISTANCE.

last the capital of United Italy. Victor Emmanuel was succeeded in 1877 by his son Humbert. The Pope still resides in Rome, but has no jurisdiction except within what is known to Italy as the "Leonine City." Parliamentary government has been accorded in the fullest degree.

The defeat of the Italian army in Abyssinia, March 2, 1896, caused great excitement at Rome and elsewhere throughout the country; and troops were called out to suppress demonstrations against the government; Crispi's ministry immediately resigned and another cabinet was formed.

SPAIN

SPAIN, after being partially colonized by the Phœnicians and Carthaginians, became a Roman province under Augustus, and some 400 years afterward was successively overrun by the Vandals, Goths and other northern races. In the eighth century the Moors successfully invaded the country, and remained virtual masters of the entire Spanish portion of it till the reign of Ferdinand and Isabella, when, in 1492, they were finally driven back into Africa.

Under Charles V., and his son Philip II., Spain became the greatest power in the then world. But with the latter prince began that decay which speedily reduced it to a mere shadow of its past glory and importance. After the death of Charles II., in 1700, began the so-called *War of the Spanish Succession*, in which the rival claims of France and Austria to the throne terminated in favor of Philip V., grandson of the French King Louis XIV.

Between 1759 and 1763 an unsuccessful war was waged against England, and in 1778 Spain again took up arms against that country, and at the peace of 1783 received the island of Minorca and the American Floridas.

The later chief events in Spanish historical annals have been: The struggle against Napoleon during the so-called *Peninsular War;* the restoration by French arms, in 1823, of the Bourbon dynasty in the person of Ferdinand VII., whose tyranny had led to a revolution in 1820; the *Carlist War*, 1833-40, ending in the triumph of the Christinos; the exile of Queen Christina in 1854; a war with Morocco in 1858-9; the annexation of St. Domingo in 1861; a war with Peru and Chili in 1864-5; the downfall of the Bourbon monarchy in 1868; the insurrection in Cuba in 1868-75; the election of Amadeus of Savoy as King of Spain in 1870; his abdication in 1873; the adoption of a republican form of government under Castelar and Serrano, 1873-4; and the restoration of the monarchy in the person of Alfonso XII., son of Isabella, January, 1875. Spain, from 1873 to 1875, was the theatre of a civil war waged against the government by the adherents of Don Carlos, who held nearly all the northeast of the country.

On March 1, 1896, a mob in Barcelona attacked the American Legation, tearing down the Stars and Stripes and trampling them under foot. The town authorities attempted to disperse the mob and used their efforts to protect the Legation. On the day following, the Spanish authorities called at the Legation, expressed regret for the unfortunate occurrence and promised full reparation. The immediate cause of the outbreak was the proposed resolutions, by the United States Senate, expressing sympathy with the attempt in Cuba to gain independence. For several days the demonstrations against the American flag continued and troops were required to disperse the mobs.

PORTUGAL

UNDER its ancient name of Lusitania, Portugal was constituted a Roman province under Augustus, and so remained till the fifth century, when it became subject to the Visigoths. In the eighth the Moors took possession of the country and held it for four centuries, at the end of which period they were driven out by Prince Alonzo Enrique, of Castile, who thereupon was elected King. Under the dynasty he founded Portugal made rapid progress, and under John I., and in the reigns of John II. and Emanuel, 1481–1521, became eminent as a maritime and colonizing power, establishing settlements in the East and adding Brazil to her dominions.

Under Sebastian III. began that fruitless crusade against the Moors which cost that monarch both his life and crown. Later, Portugal became a dependency of Spain, but in 1640 she threw off the yoke and placed the Braganza dynasty on the vacant throne. In 1807, after the deposition of the royal family by decree of Napoleon, Dom Pedro, the King, withdrew to Brazil, of which country he became first Emperor.

The Government is a limited monarchy, and the Legislature, known as the *Cortes*, consists of two houses—one of Peers, the other of Deputies. The Roman Catholic is the state religion, but entire toleration with respect to others prevails.

A Steady Decline.

For many years the financial condition of Portugal has gone steadily from bad to worse. The rush of the European powers to appropriate African soil awakened, for a time, her old spirit and ambition, but the awakening came too late. The march of events and the energy of her rivals have wrested from her many square miles that she claimed as her own, but had done next to nothing to colonize and develop. England in the end of 1889 compelled Portugal to abandon her claims to Nyassaland, and two years later a treaty was signed defining the respective spheres of influence of the two countries in East and West Africa, especially in the basin of the Zambesi. Further delimitations were agreed upon in 1891.

In the meantime Charles I. had succeeded his father, October, 1889. The action of Britain occasioned an outburst of strong popular feeling in Portugal, which the republicans turned to their own advantage, and they were greatly helped by the successful revolutions of the republicans in Brazil and the expulsion of the Emperor, November, 1889. But in the home country their advantage proved to be only temporary.

GREECE

GREECE shares with Rome the absorbing interest of ancient classic story. Glorious in arts and arms, renowned for her temples and mythology, her warriors, poets and statesmen, her controlling influence at one time in the affairs which make up the annals of ancient nations, she is at once the admiration of the scholar, the artist and the historian. Her classics have come down to us with all the charm of learning and romance and have long been the study of the most cultured classes of modern times.

The earliest settlers in ancient Greece were the Pelasgi, who were in course of time replaced by the Hellenes, a people which consisted of four tribes, namely, the Æolians, Dorians, Ionians and Achaians. Colonists from Phœnicia and Egypt followed the Hellenes, and joined with them in extending their united sway over the country. About 2000 B. C. the great cities of Athens, Sparta, Thebes, Argos and Corinth sprung into existence, and became in course of time the centres of political governments of a democratic form, and of a progressive advancement in civilization, education and artistic refinement. Their commerce embraced within its scope the ports of Gaul and the Mediterranean, at the same time that their naval and military power became extended in a corresponding ratio.

Philip of Macedon.

Civil discords, however, originated the Peloponnesian War, B. C. 434–404, by which their union of interests became broken up, and rendered Greece a prey to foreign invasion under Philip of Macedon, who, after the battle of Cheronæa, B. C. 338, became master of the country. Afterward, by the disruption of the Achaian League, Greece became a Roman province, 146 B. C. Then followed the decline and ultimate extinction of the glories of Greek art and civilization.

Invasions by the Goths, Vandals and Normans succeeded one another in turn till 1261, when the whole country—except Athens and Nauplia—became merged in the Greek Empire of Michael Palæologus. The Turks took possession in 1481, but their tenure of the country was contested for a period of two centuries by the Venetians, until finally it was definitely secured to them by the treaty of Passarovitz.

In 1821 a revolution broke out against the Ottoman yoke, and the independence of Greece was secured by the interference of foreign powers, after the defeat of the Turks at Navarino, 1827. After a brief provisional government under Count Capo d'Istria, Greece was made into a monarchy by the protecting powers, and Otho, of Bavaria, placed on the throne in 1832. He reigned till 1863, when he was dethroned and the crown conferred upon George I., a prince of the reigning house of Denmark.

TURKEY

NO reputation less enviable belongs to any nation of the globe than that of Turkey. "The Unspeakable Turk" has long been an object of suspicion and hatred by reason of political intrigues, violation of sacred oaths, the rapacity that characterizes the savage, and the universal sentiment, amounting to a tyrannical law, which subjects everything to the reign of the Mohammedan religion. The most recent history of Asia is dark with the crimes and massacres that have made Armenia the theatre of wholesale slaughter, such as perhaps is unparalleled in all the annals of time.

The Ottoman Empire, properly speaking, comprehends all the countries in which Turkish supremacy is directly or indirectly recognized, and it includes some of the most beautiful as well as most ancient sections of the globe, in point of civilization. As a whole, the empire is an aggregation of governments, often widely separated, and only united by having been the subjects of a common conquest.

The Turks are first noticed in history about the year A. D. 800. They came originally from Asia and are of Tartar origin. They captured a portion of Armenia, which they called Turcomania, and in a short time pushed their dominion to the Hellespont, and finally obtained a foothold in Europe. The petty states into which their dominions were at first divided were united under Othman, one of their chiefs, in 1289. After him came his son, and then his grandson, Amurath, who established the Janizaries in 1362, a powerful and well-disciplined army, composed of youths selected from his Christian captives. He conquered the greater part of Thrace, and made Adrianople his capital.

His successor, Bajazet I., conquered the greater part of the Eastern or Greek Empire and besieged Constantinople; but being summoned to Asia to stop the encroachments of Tamerlane, he had to abandon the siege. Bajazet assumed the title of Sultan, his predecessors being known by that of Emir. In 1453, Mahomet II. took Constantinople and made it the capital of the Turkish or Ottoman Empire. His grandson, Selim I., conquered Syria and Egypt, and Solyman the Magnificent, annexed the greater part of Hungary and extended the Turkish dominions in the East.

The Turks Defeated.

From the reign of Solyman the power of the Ottomans continued unabated till 1683, when John Sobieski, King of Poland, defeated the Turks and drove them out of Austria and Hungary. Thenceforward the power of Turkey continued steadily to decline. By the peace of Carlowitz, in 1699, Austria, Venice and Poland received back the territory previously wrested from them by Turkey.

During the eighteenth century Turkey was engaged in an almost uninterrupted series of wars with Russia, the result of which was seriously detrimental to the Turkish interests. Russia secured the Crimea and Azov, and the River Dniester was made the boundary between the two empires.

The Greeks rose in rebellion in 1821, and adopted an independent provisional constitution in 1822. The manly efforts made by the Greeks in face of overwhelming odds induced liberty-loving people in many European countries to furnish the patriots with men and money. Prominent among those who figured in the struggle for Grecian freedom was Lord Byron, who died at Missolonghi in 1824. Russia, France and England finally interfered in behalf of the Greeks, destroyed the Mohammedan fleet at Navarino, and compelled Turkey to acknowledge the independence of Greece, 1829.

In 1853 the Emperor Nicholas of Russia demanded that a Russian protectorate be established over the Greek Christians in the Turkish Empire—a demand that was resisted by the Sultan. Nicholas thereupon declared war and invaded the Danubian Principalities. England and France joined Turkey as allies in 1854, and in 1855 Sardinia also embraced the cause of the Sultan.

The Russians were defeated and had to evacuate the Danubian Principalities. The seat of war was then transferred to the Crimea, a peninsula in the south of Russia, on the Black Sea. Here the Russians were defeated by the allies at the battles of Alma, Inkerman and Balaklava. Sebastopol, the greatest Russian stronghold on the Black Sea, was besieged, and after a protracted resistance capitulated. Peace was finally concluded at Paris in 1856.

War with Russia.

The European powers having been unable to satisfactorily settle the differences between Turkey and her other rebellious provinces, Russia interfered in behalf of the latter, and declared war against Turkey in 1877. A desperate struggle ensued, the most celebrated battle fought being that of Plevna, in which the Turks suffered a severe defeat. The result of the war was that the Danubian Principalities secured their independence, and Russia received Bessarabia, Batoum, Kars and Ardahan in Asia.

Turkey in Europe at present covers about 62,028 square miles, and has a population of 4,786,545. Turkey in Asia occupies 710,320 square miles, and has a population of over 21,608,000.

In Egypt (the principal Turkish possession in Africa) the hold of the Sultan appears to be very weak. The present condition of Turkey seems to warrant the title, "the sick man of Europe," for some time applied to it.

Turkey has always been true to herself.

The history of the Mohammedan power is one of rapine, outrage and murder, and the massacres in Armenia were only what might have been expected. None the less they were enough to awaken the horror and indignation of all civilized peoples.

EGYPT

THE epoch of Menes is the first chronicle in the history of ancient Egypt, and has been placed at 5004 B. C. This fact points to a very ancient origin. Allusions are made to Egypt in the Book of Genesis and many other parts of the Bible. The history of the country is largely written upon tablets of stone, which in recent times have been deciphered, thus rendering Egypt a country of peculiar interest.

Unfortunately the decline which has affected all the old nations of the East has cast down the ancient glory and left everywhere the footprints of death. Still, in her ruins Egypt is a country of marvelous interest. Long subject to outside powers, she still maintains her traditional character and customs.

A royal dynasty ruled for some centuries before Cambyses, 524 B. C., and by that line of monarchs were constructed those grand pyramids, temples and obelisks, whose remains make of Egypt the oldest of classic lands. Cambyses brought Egypt under Persian sway till the time of the invasion of Alexander the Great, who built Alexandria.

After him came the line of Ptolemies, ending in the person of Cleopatra, under whom it became a Roman province. After a possession of 760 years the Romans gave place to the Saracens, who ruled Egypt till 1250, when the Mameluke dynasty was established.

At the beginning of the sixteenth century it fell into the hands of the Turks, under whom it became a satrapy, and the object of incessant contention among the Mameluke Beys. The French under Napoleon occupied the country, 1798-1802. In 1811, Mehemet Ali, after a massacre of the Mamelukes, made himself master of Egypt, and the succession was confirmed to him and his descendants by the treaty of London, 1841.

The Title of "King."

In 1866 enlarged powers were granted the Egyptian rulers by conferring on them the title of Khedive (king). The former Khedive Ismail Pasha, was deposed by the Sultan, June, 1879, and was succeeded by his son, Mohammed Tewfik.

The reigning Khedive is Abbas, born July 14, 1874, son of Mohammed Tewfik, who succeeded to the throne on the death of his father, January 7, 1892. In the summer of 1882, in consequence of a military rebellion, England intervened, subdued the uprising, and restored the authority of the Khedive. Egypt embraces 10,698 square miles and has a population of 6,817,265. The prevailing religion is Mohammedan, exclusive of 600,000 Copts, who have the honor of being Christian descendants of the ancient Egyptians.

The country changes but slowly, is fixed and stereotyped, like all others of the Orient, and gives little sign of progress.

PALESTINE

PALESTINE derives its name from the Hebrew *Pelescheth* ("Land of the Philistines"), and in remote times was known as Canaan. Under the reigns of David and his son Solomon, it constituted a flourishing kingdom. The subsequent history of Palestine is identical with that of Judea and of the Jewish people, until its subjection by Rome.

The country remained in the power of the Romans till the conversion of the empire to Christianity, when it became an object of religious veneration. In the sixth century it fell under the sway of the Mohammedans, which gave occasion to the Crusades. Jerusalem was taken by the European forces, and was under Godfrey of Bouillon erected into a Latin kingdom, which endured for above eighty years, during which the Holy Land streamed with Christian and Saracen blood. In 1187 Judea was conquered by Saladin, on the decline of whose kingdom it passed through various hands, till, in 1517, it was finally added to the Turkish Empire.

To all Christians throughout the world Palestine is a Holy Land. It is associated with the lives of patriarchs, prophets and apostles, and also with that of Jesus of Nazareth. Early in the Christian era Jerusalem received the blow that shattered its sacred temple, and began the downfall of the most remarkable nation of the ancient world. The old landmarks are obliterated, the country has been desolated, no bright future seems to be before it, yet of all lands on the face of the earth it is the one whose soil is trod with reverent feet, and whose localities have an absorbing interest to the visitor.

Modern Changes.

As regards Jerusalem, a new town has sprung up outside the walls, and there are about 50,000 Jews in and about the holy city. Yet the character of the ancient nation has been changed and Palestine as it once was does not exist.

The present condition of the country shows the beginning of rapid changes in every direction. The thousands of visitors who every year pour into the country contribute in no small degree to alter the character, the habits and the ideas of the people. Roads are being everywhere constructed in a country where, but a few years ago, there were no roads. The traveler can now drive from Jaffa to Jerusalem, from Jerusalem to Jericho, and also from Jerusalem to Hebron. Societies formed for exploration have done much toward preserving the history of the country as revealed in its present ruins. Those who wish to see Palestine as it has been for a thousand years and more, must go at once or they will never have the opportunity.

ARABIA

ARABIA consists of a peninsula, with a length of about 1500 miles, a breadth of 900 miles (Suez to Bassorah), and an area of more than 1,000,000 square miles. It sea-coast is over 1200 miles long, and a large proportion of the country is an arid, sandy desert. On the shores of the Red Sea and Persian Gulf there is, however, considerable good and fertile land.

The Arabs claim descent from Ishmael, and have always been a wild and independent people of nomadic instincts. Their history proper begins with the advent of the prophet Mohammed and the foundation of the Caliphate. There are properly from 12,000,000 to 15,000,000 inhabitants of the Peninsula, of whom all but a few Guebres (fire worshippers), some negroes and a few Jews, are Mohammedans.

Coffee, believed to be indigenous, is one of the chief articles of export, and balm, frankincense, gum arabic, cassia and other drugs and spices grow freely. Wheat, barley, beans, millet and lentils form the food of the natives, and almonds, dates, and tamarinds are largely exported. The rivers of Arabia are few and unimportant; the heat is intense, and little rain falls at any season.

CHINA

THE early history of China is lost in antiquity. In the 11th century the country was subjugated by Jenghis Khan, whose descendants were afterward supplanted by the *Ming* dynasty of native princes. In 1294 the first Christian missionaries reached Pekin. In the early part of the 17th century, the Ming dynasty was subverted by the Mantchoo Tartars, who substituted an emperor of their own race.

The first foreign powers to establish relations with China was Great Britain in the 17th century. In 1839, seizure by the government of opium belonging to British merchants was the cause of hostilities, known as the "Opium War," 1840, and which was put a stop to by treaty in 1842, by which the Island of Hong-Kong was ceded to England, five ports opened free to foreign commerce, and a heavy indemnity paid the English merchants. This treaty was followed by one with the United States in 1844, and with France in 1845. In 1851, a rebellion on a large scale broke out, known as the Tae-ping Civil War, which, after many successes on the part of the rebels, was temporarily suppressed in 1853. Another war with England, in conjunction with France, occurred in 1856, in which Canton was bombarded, and Pekin menaced by the Europeans. Another treaty, June 26, 1858, terminated hostilities, and gave new and important advantages to foreigners, among which were the toleration of Christianity, the opening of new ports to commerce, and the reception at Pekin of foreign envoys.

In 1859, an attempt to ignore this treaty led to the occupation of Pekin by English and French troops; after which the treaty was ratified. From 1861 to 1868, the Tae-ping rebellion broke out anew, with slight intermissions. In 1867, Mr. Burlingame was appointed envoy-extraordinary from the United States to Pekin, and in 1868 effected a treaty with China, which conferred on Americans in China the same rights and privileges possessed by Chinese in the United States. In 1871, to avenge outrages by the Coreans upon American shipwrecked mariners, a United States force visited their peninsula. Recent years have seen the termination of the rebellion in Sungaria, and better relations between China and Russia, arising over the Kashga rebellion, which was put down in 1879.

The war between China and Japan in 1894 resulted disastrously to the former, the superiority of the Japanese arms being evident at every point of the contest. China sought by diplomacy to avert further catastrophe, and the strong hand of Russia was soon seen in the terms of peace.

JAPAN

THE empire is politically subdivided into provinces, departments and districts, formerly governed by upwards of 200 princes called *Daimios*, each of whom held absolute power over his own jurisdiction; in 1870–1, these princes were made subordinate to the *Mikado*, or supreme ruler of the Empire. This Mikado, or Emperor, is considered of semi-divine origin, and was until quite recently invisible to the people at large.

In 1542 the Portuguese established a settlement at Nagasaki, and the Dutch obtained a temporary footing in 1600, but intercourse with the outside world came to be entirely suspended until about the middle of the present century. Since 1867, several embassies have visited the United States and Europe. In February, 1889, a new constitution was promulgated, establishing important reforms, such as a parliament, the right of suffrage to all men twenty-five years old and over, who pay a certain amount of tax, liberty of religion, of speech and the right to hold public meetings. Judges cannot be removed, except by special legislation.

Japan has shown a remarkable ability to adapt herself to Western civilization. With singular acuteness she has adopted ideas from other countries, and within the last few years has undergone rapid changes. These do not so much affect her form of government as her system of education, and, to some extent, her manners and customs. The Japanese have been called the "Yankees of the Orient."

When war broke out between her and China in 1894, she showed herself fully equipped for the conflict by possessing arms of the most recent type and by being thoroughly versed in the most approved methods of military tactics. Her swift and brilliant victory was anticipated from the first.

BRITISH INDIA

IN the widest sense of the term, British India comprises all that part of the great Indian peninsula which is directly or indirectly under British rule, as well as certain countries beyond that area which are under the control or protection of the Governor-General. The Government of the Indian Empire is entrusted to a Secretary of State for India, assisted by a Council of not less than ten members, vacancies in which are now filled up by the Secretary of State for India.

But the major part of the Council must be of persons who have served or resided ten years in India, and have not left India more than ten years previous to the date of their appointment; and no person not so qualified can be appointed unless nine of the continuing members be so qualified. The office is held for a term of ten years; but a member may be removed upon an address from both Houses of Parliament, and the Secretary of State for India may for special reasons reappoint a member of the Council for a further term of five years. No member can sit in Parliament. Therefore it will be seen that the intention is not to allow the representatives in the Council to have any controlling voice in the affairs of the country, yet they possess a certain influence.

India is the ancient name of all that part of Southern Asia which extended from Persia to Serica (North China). The knowledge possessed of this portion of the world is extremely small, and dates from the expedition of Alexander the Great. Seleucus Nicator extended the conquests of the Greeks beyond the furthest point reached by

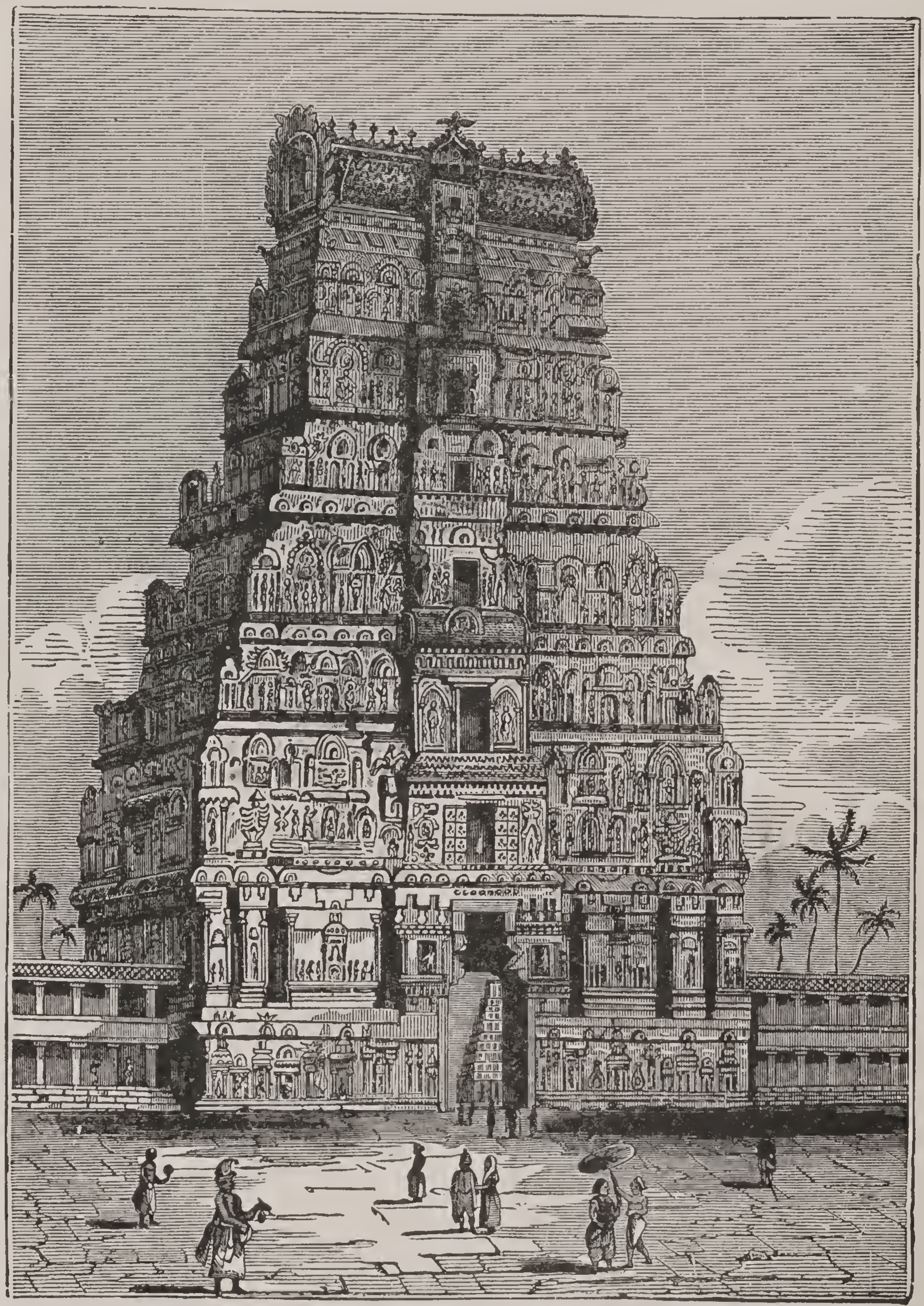
Alexander. Ptolemy learned more from subsequent travelers, and his grand division of the country into India Within and Beyond the Ganges has remained to the present day.

From the time of the expedition of Alexander the Great, in the 4th century, B. C., down to the 15th century of our era, the history of India, divided as it was into an infinity of independent states, is of comparatively little interest for the general reader. In 1525 the country was invaded by Baber, who established the Mogul line of princes, whose power culminated under his successor Aurungzebe.

British Arms.

After the latter's death, 1707, the Mogul dynasty began to decline; and after an unsuccessful attempt made by the French to establish their power in India, the foundations of a vast political power were laid between 1750 and 1765, by the greater resources and superior maritime strength of the English. Since that period the history of India presents but a succession of battles fought and territories conquered by British arms.

In 1857 occurred the great Sepoy mutiny, which was extinguished after much bloodshed. In the year following, the foreign commerce of India, long a monopoly in the hands of the East India Company, was finally thrown open to the world, and their political jurisdiction vested in the British crown. The assassination of the Governor-General of India, the Earl of Mayo, in 1872, first attributed to political motives, seems to have been only an act of fanaticism. In 1878, over 500,000 deaths occurred at Madras alone by famine.



PAGODA OF CHILLENBAUM, INDIA.

The costume is in numerous nationalities characterized universally by the ease, lightness and loseness common in the East and suitable to the hot climate. But it varies in the many provinces, and, indeed, with every nationality. The turban (pagri) has every sort of dimension, from minute neatness to turgid massiveness.

The waistband (dhoti) extends often below the knee, in which case there is no trouser. Jackets in many styles are common. The woman's dress in many respects resembles that of the men. The petticoat is not universal. The headdress is often extended, so as to hang gracefully down the back. The shoe is not always worn; indeed, the humbler classes are generally barefooted. With them the blanket is often a plaid.

The black colors of Europe are seldom seen, but indigo blue is common. Otherwise white, set off by gay margins, and rich scarfs and shawls is the prevailing color. A
a whole the national dress is picturesque
and a holiday crowd has the appearance o
a flower garden.

Four-fifths of the population are affecte
largely by the caste system connected wit
the popular religion. A religious sanctio
in some degree attaches to infant marriage
or child marriage, with all classes; also, t
the seclusion of women, and to the prohibi
tion against remarriage of widows with th
upper and middle classes.

In practice the women of the masses ar
not secluded, but, on the contrary, appea
everywhere, and work out of doors; they
remarry, too, if in widowhood. The burning of widows on the funeral pyres of thei
husbands has long been suppressed by the

ENGLISH TROOPS ON THE MARCH IN INDIA.

riminal law under British rule. Polyandry s found only among a few of the aboriginal ibes. Old customs, many of them barbarous and cruel, are disappearing before the advance of Christian civilization, but here, as elsewhere, the advance is very slow.

AFGHANISTAN and BELOOCHISTAN

AFGHANISTAN is subdivided into the three separate principalities of Cabul, Candahar and Herat. The Afghans belong to the Iranic race; they are of a vigorous spirit and proud emper. Afghanistan is continually being hreatened by England and Russia, both of vhich nations desire the possession of Herat, vhich is the key of Central Asia.

The area is estimated at 225,00 square niles. Four-fifths of the country consists f rocks and mountains; the latter from the able-land in the north, varying from 15,000 o 16,000 feet in height and in the case of he Hindoo Coosh, to 20,493 feet.

Beloochistan is subdivided into six provnces. Nearly the whole country is mounainous, except in the northwest and along he coast, its general characteristics being a ugged and elevated surface, barrenness and eficiency of water. The famous Bolan ountain pass, which is the only means of ommunication with the interior of the couny from the plains of Northwest India, is on he northeastern boundary. Kelate, the apital, is situate at 6000 feet above sea evel. The products vary with the climate, vhich is cold in the elevated parts, and exessively hot in the lower valley.

The pursuits of the people are mostly astoral. The inhabitants consist chiefly of Belooches and Brohooees, two tribes which are probably a race of mixed Tartar and Persian descent. Beloochistan was formerly subjected to Persia, and afterwards to Afghanistan, but its people conquered their independence in 1758. They are ruled by several chiefs, under the more or less nominal authority of the Khan of Kelat

Products of the Country.

Among the natural productions of Afghanistan is the plant yielding asafœtida. The castor-oil plant is everywhere common, and good tobacco is grown in the district of Kandahar. Aitchison says that the cultivated area around Herat produces magnificent crops of wheat, barley, cotton, grapes, melons and the mulberry tree; the production being only limited by the amount of labor procurable.

Surrounding the villages and in orchards the ash, elm, apricot, apple, plum, quince, peach and pomegranite are cultivated. In special localities are forests of pistachio, its leaves being used in dyeing.

The general appearance of the country during winter is barren and arid in the extreme, owing to the absence of trees and woody shrubs; but in spring a mass of vegetation springs up, giving a grand coloring to the landscape. The industrial products are silk, chiefly for domestic use, and carpets.

The manufacture of *postins*, or sheepskins, is one of the most important of the industrial occupations of the people, and of late years the trade in this article has greatly increased. Afghanistan is crossed by several trade-routes leading to India on the one side, and to Persia and Turkestan on the other; merchandise is carried by camels.

SIAM

LITTLE of a reliable character is known of the early history of Siam. The foundation of Ayuthia, its former capital, dates from 1350, and in the sixteenth century its territorial rule extended from the Cambodia River as far south as the Strait of Malacca. In 1782 the existing dynasty mounted the throne, and in 1855–6, treaties were effected with the United States, England and France, which have largely facilitated foreign trade, opened out the resources of the country, and generally been the means of introducing many of the arts and manners of the Western nations among the Siamese people. The population is estimated at 6,300,000.

The monarchy is absolute and hereditary, and there are two kings, of whom the first is the actual reigning sovereign, the second receiving one-third of the revenue, and exercising the administrative functions of chief minister. Buddhism is the dominant form of religion, and the pagodas of Siam are the finest of all Indian temples. Within the last few years the king has raised a small regular army officered by Europeans; and in time of war the entire adult population are liable to be called out any time for military service.

The men are of an olive color, with little beard; but the women are of a straw complexion. They have been said to excel in the fabrication of gold, in fireworks and in miniature-painting; but in mechanical ingenuity they are decidedly inferior to the natives of China and Cochin-China.

Characteristics of the People.

The chief production of Siam is rice. It is the national food and its export forms a great source of wealth to the country.

The Siamese are very social, vain and fond of bright dresses and jewelry. Their intercourse with each other is conducted with ceremonious attention to distinctions of rank. They shave the heads of their children, with the exception of a tuft on the crown, which is cut off with great ceremony at the age puberty.

Marriages are negotiated by elderly women who find out if the birthdays of the intended bride and bridegroom are suitable, for the Siamese are superstitious in this respect. The marriage ceremonies, during which the chewing of betel-nut plays an important part, last two or three days and all friends are entertained liberally during this time. The houses are built of wood or bamboo. thatched with palm. Furniture there is none, unless a mosquito net, a mat or two and cooking utensils be reckoned furniture, and these are very crude.

PERSIA

PERSIA dates its rise as a nation from after the fall of the Assyrian and Babylonian Empires, and under Cyrus extended from the Indus almost to Greece and Libya. Conquered by Alexander the Great, it became during several centuries afterward a Greek satrapy; and about 200 B. C. a Parthian monarchy. In the third century A. D. the native rule was restored under the Sassanides dynasty.

Later, Persia became the prey of the Tartars, the Turks, the Afghans, until redeemed by the victories of Nadir Shah. After the death of the latter the country again became the scene of social anarchy and civil war, which continued till the establishment of the present dynasty. In 1871–2 the more Southern and Eastern provinces were desolated by a terrible drought and famine, which swept away thousands of the inhabitants. In 1873 the Shah visited Europe. Estimated population, 10,000,000.

Some of the immense valleys of Persia abound with the rarest and most beautiful vegetable productions; among them are wheat of the very best quality, barley and other cereals, cotton, sugar, rice and tobacco. The vine flourishes in many of the provinces, and the wines of Shiraz are celebrated. The mulberry-tree is largely cultivated, silk being one of the most important staples of the country. The chief manufacture is that of silk stuffs, of the richest kinds; other fabrications include textile goods, arms, carpets, shawls, etc. Persian commerce is very extensive, and chiefly carried on with Russia by way of the Caspian Sea, and with British India by way of the Persian Gulf.

A Despotism.

The government is a despotism under the *Shah*, or sovereign; and though a large amount of the taxes levied never reaches the royal treasury, yet the latter is reported to possess immense wealth in bullion and precious stones. Mohammedanism of the Shiah type is the prevailing form of religion. The Persian (or Persic) is the most celebrated of all the Oriental languages in respect of strength, copiousness and poetic harmony, and is written from right to left.

The houses in Persia, those of the wealthiest people, not excepted, appear contemptible, being generally built of earth or mud and are grouped, even in the towns, with little attention to uniformity or order. The interiors, however, of the houses of the rich are sometimes perfect paradises of luxury and elegance. The miserable look of the towns is, moreover, greatly redeemed by the beauty of the gardens which surround them.

THE BARBARY STATES

BARBARY and Egypt formed nearly all of Africa known to the ancients. It was peopled chiefly by Moors, Numidians and Phœnician colonists; it attained great celebrity during the Carthaginian dominion; was afterwards subject to the Romans, and occupied for nearly a century by the Vandals. The Arabs took it finally from the Romans, about B. C. 697.

Barbary is an extensive region, comprising all the northern portion of Africa, from Egypt to the Atlantic Ocean, and from the Mediterranean to the Greater Atlas. It is divided by the Atlas range into two regions, that on the north comprising the four Barbary States, viz., Morocco, Algiers, Tunis and Tripoli; and the southern region, called Beled-ul-Jerid, or Country of Dates.

In this region stood the celebrated city of Carthage in ancient times. Its site was about ten miles northeast of the present city of Tunis. It was founded by Phœnicians, eight hundred and sixty-nine years before the Christian era. The Phœnicians were the first people who engaged in commerce, and founded colonies for the purpose of carrying on trade.

The city of Algiers was built by the Saracens, in the year 944. The Government, called the Regency of Algiers, was founded in 1518, by two Turks, named Horuc and Hagradin. They were brothers, and both bore the name of Barbarossa, or Red-Beard.

American Resistance.

The country now called Morocco was conquered by the Saracens about the same time with the other Barbary States. So also was Tripoli. All these states, except Morocco, afterward fell into the hands of the Turks. During a long period, the Barbary States were in the habit of fitting out vessels to cruise against the ships of other nations. Their prisoners were sold as slaves, and never returned to their own country, unless a high ransom was paid for them.

The Americans were the first who made any considerable resistance to these outrages. In the year 1803, Commodore Preble sailed to the Mediterranean Sea with a small American fleet. He intended to attack Tripoli; but one of his frigates, the Philadelphia, got aground in the harbor. The Turks took possession of the Philadelphia. But one night Lieutenant Decatur entered the harbor of Tripoli, and rowed toward the captured vessel, with only twenty men. He leaped on board, followed by his crew, and killed all the Turks, or drove them overboard: the Philadelphia was then set on fire.

After this exploit, Commodore Preble obtained some gunboats from the King of Naples, and with these and the American vessels, he made an attack on the fortifications of Tripoli. The Bashaw of Tripoli was forced to give up his prisoners. In the year 1815, Commodore Decatur—the same who had burnt the Philadelphia—was sent with a fleet against Algiers. He captured heir largest vessels, and compelled the Algerines, and the Tripolitans also, to agree never more to make slaves of Americans.

In 1816, Algiers was battered by an English fleet under the command of Lord Exmouth. This was the severest chastisement that the Algerines had ever received at that period. But in 1830, the French sent a large naval and military force against Algiers, commanded by Marshal Beaumont.

The war continued for seventeen years, an Arab leader, by the name of Abd-el-Kader, making a powerful resistance to the French. At length Abd-el-Kader was defeated and taken prisoner; so the country was conquered, and Algiers, under the name of *Algeria*, is now a province of France.

ABYSSINIA

ABYSSINIA was a part of ancient Ethiopia; its inhabitants are of a dark olive complexion. In 1867, the British Government, having wrongs to avenge, sent to Abyssinia an army of 10,000 men; and the expedition resulted in the death f the Emperor Theodorus II., and the detruction of his capital, Magdala.

A few years ago Italy endeavored to plant colony in Abyssinia. The new colony is early self-supporting, but in their endeavor o extend their influence, the Italians came o blows with the Abyssinians whom they ad taken under their protection. Abyssinia, he only state of Central Africa with a preence to civilization, is made up of the terriory of a few hundred fierce clans whose hieftains render more or less obedience to he "Negus" or King. The people of that ountry are nominally Christians, but their rites are strangely mixed with Pagan usages as old as their hills. The main difficulty between Italy and Abyssinia seems to arise out of the determination of the former to put down slavery.

Early in March, 1896, a bloody battle was fought between the Abyssinian troops and the Italian army, in which the latter was utterly defeated with great loss of life, and a check was put upon the ambition of Italy to make for herself a position like other European nations on African soil. The defeat created great excitement in Rome and other parts of Italy, and led to the instant downfall of the Crispi Ministry.

Abyssinia consists of two districts, Tigre and Amhara and Shoa. The country is mountainous, but in the vales the soil is fertile. The rainy season continues from June to September, succeeded without interval by a cloudless sky and a vertical sun, but cold nights follow those scorching days. Though situate between the tropics, the productions of Abyssinia rather resemble those of the temperate than of the torrid zone. The population is estimated at 3,000,000.

REPUBLICS IN SOUTH AFRICA

ONE of the earliest settlements in South Africa was that of the Dutch at the Cape of Good Hope. In 1806 Great Britain acquired their domain, following which the Dutch emigrated in large numbers, moving north and east. They acquired by force of arms from the Zulas the country known as Natal, where they settled. The number of the Boers, as they were called, who left the British colonies was about 10,000. They organized a government, and in 1854 the British guaranteed them complete independence.

The Boers also established a republic known as the Transvaal, the independence of which was acknowledged in 1852. Here they have remained until the present time. They have had the name of being very exclusive and refusing rights to foreigners who wished to enter their country. In 1887 the British attempted to take the country, and for a while occupied it. In 1880 the Transvaal Boers threw off the British yoke and re-established the republic, after a conflict with the British, in which the latter were defeated with great loss.

Early in 1896 a British company, with possessions bordering on the Transvaal, attempted to conquer the Boers. In this attempt they were led by Dr. Jameson, but his force was signally defeated. This disaster caused excitement throughout England especially as Germany expressed its sympathy with the Boers.

The population of the Transvaal is 119,128 Europeans, of whom half are Dutch The native population is 560,000.

The state has immense latent wealth in its minerals, for, in addition to the numerous gold-fields the deposits of silver, copper and lead, iron, coal, cobalt, and other metals and minerals, are sufficient to show that nature has favored the Transvaal beyond all African States. The country is rich in corn and pasture land. The climate is, as a rule, healthy and in some parts exceptionally bracing. The number of English-speaking residences is fast increasing on account of emigration.

Republic of Liberia.

Liberia is a small Republican State of West Africa and occupies a part of the coast of North Guinea. Length, 600 miles; breadth interiorward, 50 miles. Monrovia is its capital, at the mouth of St. Paul's River. The principal exports are coffee, sugar, palm-oil, camphor, indigo, ivory and gold dust. The population consists of 20,000 "Americo-Liberians" (immigrants from America and their descendants) and 600,000 aborigines. The first settlement was formed by free negro colonists from the United States, at Cape Mesurado, in 1820. The colony became an independent republic in 1847. The constitution and government are based upon the model of those of the United States.

The Congo Free State has sprung out of the discoveries of Stanley and the explorations of the International Association, founded at Brussels for the opening up to civilization of the Congo and its tributaries. Its autonomy was recognized during 1884 and 1885 by the leading powers of Europe, and by the United States, conditioned upon its maintaining the principles of free trade. There are twelve territorial divisions, the capital being Boma.

The central government is at Brussels, and consists of the King of the Belgians as sovereign, and three departmental chiefs. On the Congo there is an Administrator-General and several European administrators of stations and districts. The rest of West Africa is variously "protected" by England, France, Germany and Portugal.

CAPE COLONY

CAPE COLONY is an extensive territory belonging to Great Britain, comprising the greater portion of the South African continent. It has an area of 183,286 square miles, with a coastline of 1,150 miles. The entire country consists of three elevated plateaux intersected by three great mountain-chains, between two of which is what is called the Great Karroo, a desert plain nearly 500 miles long by 100 broad. The principal rivers are the Orange, Great Fish River, Elephant, and their affluents. Saldanha Bay is by far the best harbor on the coast. Minerals are known variously to exist, but have been hitherto little mined. Some gold has been found, together with diamonds and and other precious stones. The products are fruits, tobacco, wool, etc. Sheep-farming is the staple industry of the country. The chief towns are Cape Town (the capital), Grahamstown, Zwellendam.

The aborigines consist of Hottentots and Caffres; the colonists are chiefly English, Dutch and French. Cape Colony is governed by an English viceroy, and is an important British military and naval station, being considered the key to the Indian Ocean. In 1650, the cape was colonized by the Dutch, from whom it was taken by the English in 1795, and finally ceded to them in 1815. Population, 566,158.

Ostrich-Farming.

Ostrich feathers have long been an article of export from the Cape. For many years they were obtained at the expense of the death of the birds, but in 1864, ostrich-farming was commenced at the Cape and is now one of the leading industries. The feathers of the wild bird are more beautiful than those of the tame bird, and are recognized at once by those engaged in the feather trade. A few elephants and buffaloes are still preserved.

MADAGASCAR

MADAGASCAR is the largest of the African islands, situated to the east of the continent, from which it is separated by the Mozambique Channel, and surrounded by the waters of the Indian Ocean. It contains a population of about 4,000,000. It is 1010 miles in length, and 370 at its greatest breadth, containing an area estimated at 228,540 square miles.

The island was known to the early Arabs as Jezira-el-Komr, and became known under its present name through Marco Polo. Its actual discovery is due to the Portuguese, 1506. By a treaty signed at Tamatave, December 12, 1885, Madagascar was declared a French protectorate, and a port on Diego Suarez Bay was ceded to France, now converted into a naval station. The British acknowledged the French protectorate of Madgascar in 1890.

The soil is fertile, with rich pasturage, and magnificent forests abounding in valuable trees and medicinal plants; the other products are rice, sugar, silk, cotton, cocoanuts, bananas, sweet potatoes, indigo, pepper, India rubber, etc. Iron ore is found in several places, and coal is also said to exist; gold, silver, copper and lead are also found in small quantities. The principal manufactures are jewelry, chains, necklaces, straw hats and dresses, termed lambas.

AUSTRALIA

AUSTRALIA is an immense island, containing 3,000,000 of square miles, and is about as extensive as all the United States. The natives of Australia are described as the most degraded people in the world. They are black, and have frizzled hair like negroes; and they have very lean arms and legs. Their features have a resemblance to the monkey tribe, and they are said to be not much handsomer or more intelligent than the orang-outangs found in the Malaysian Islands.

This great island was discovered by the Dutch, in 1610, but the whole of it is now claimed as a territory of Great Britain. Captain James Cook, the celebrated naviga-

or, took possession of it in 1770. It is livided into North Australia, Western Ausralia, South Australia, Victoria, Queensand and New South Wales. The latter egan to be settled in 1778. It was then alled Botany Bay.

The first colonists were not a very respecable sort of people. The English Governnent conceived the plan of sending criminals o Australia, instead of keeping them in ail, or sending them to the gallows. Acordingly, ship-loads were transported every ear. This cannot be considered a severe unishment, for the soil of Australia is ertile, and the climate is delightful. During nany years there were hardly any honest nen in the new colony. Few of the inhabiants felt any reluctance to commit crimes, or were ashamed to be found out; for they knew that their neighbors were as bad as themselves. In later years, however, the people began to improve. The children of the convicts were now growing up, and their parents had taught them to be more virtuous than they themselves had been.

Criminals became so numerous in Australia, that it was found necessary to plant new colonies of them; and in 1804 Tasmania was appropriated to that purpose. In the year 1853 the home government abandoned the practice of transportation for crime. In 1850, rich gold mines were found in Australia, which caused a sudden and extraordinary prosperity in these colonies. Many millions of dollars, in gold, are now sent from this island to Great Britain every year.

OCEANICA

OCEANICA comprises what may be called the fifth division of the globe, including the great island of Australia and a majority of the smaller islands lying between the Indian Ocean and the China Sea on one side and the Vestern world on the other. A sketch of ustralia has already been given; others nay be noticed as follows:

New Guinea was discovered by the Portuguese in 1511. It is now divided between Holland, England and Germany; the German portion is called Kaiser Wilhelm's Land.

Borneo, which, until the naturalist Wallace's explorations proved that New Guinea had the greater area, was believed to be the largest island in the world except Australia, was discovered in 1578 by the Portuguese. In 1690 they effected a settlement, but were soon driven out from it. In 1702 and 1774 England made unsuccessful attempts to colonize the island, but of late years she has managed to acquire a controlling influence over the northwestern coast of the island.

Sumatra, Java, Celebes are among the larger single islands, while among the most important groups are the Malay Archipelago, in which these are included, and almost all of which have been subjugated by the Dutch, the Spaniards, the Portuguese and the British; the New Hebrides and Polynesia, which general terms include, among others, the Hawaiian, which is one of the most important in the Pacific Ocean. In 1829 the independence of these islands was acknowledged by the United States, who were followed in 1843 by the British and in 1844 by the French. Queen Liliuokalani, who succeeded Kalakaua, was deposed in 1894 and a republican form of government was adopted.

New Caledonia, an island lying to the east of Queensland, was taken possession of in 1853 by the French, who established there a naval station and a penal colony, which are still maintained.

New Zealand was first visited by the Dutch navigator Tasman in 1642. A colony was first established in 1840. Gold fields were discovered in 1857 which brought a large immigration. Executive authority is vested in a Governor appointed by the Crown; there is also a General Assembly consisting of a Legislative Council and a House of Representatives.

Tasmania, formerly known as Van Dieman's Land, ceased being a penal colony in 1853, since which time its population and prosperity have largely increased. A Governor appointed by the Crown holds the executive; there are also a Legislative Council and a House of Assembly.

VENEZUELA

COLUMBUS on his first voyage discovered the Paria coast on the 31st of July, 1498. The next year the whole Venezulean coast was skirted by Ojeda and Amerigo Vespucci, and the name "Little Venice" was given to an Indian village built on piles (as is common) on the shores of Lake Maracaybo; this is the origin of "Venezuela," the name now of the whole country.

In 1527 the territory of Coro was pledged by Charles V. to the Welsers of Augsburg, whose governors and adventurers had eyes and thoughts only for gold and the fabled El Dorado. In 1558 the Crown resumed possession; Caracas was founded in 1567, and in 1578 became the seat of government.

During the 17th century the attentions of the Crown were limited to extracting as much revenue from the colony as possible, while the people entered earnestly on agriculture and stock raising, and the various religious orders arrived and partitioned out the territory among themselves.

But the next century saw the beginning of troubles. The government insisted on all trade being carried on with Spain alone, and ultimately with only one city—first Seville, then till 1778, Cadiz. Legitimate commerce dwindled away, and smuggling by the

Dutch and English alone interfered to keep down the enormous prices of European goods. The first revolt occurred in 1749; other outbreaks kept the land in a ferment, until in 1810 the revolution began which ended in the independence of the country and the withdrawal of the royal forces in 1821.

From 1870 to 1877 the "Illustrious American," General Guzman Blanco, was first dictator and then president, and did much to rescue the country from its embarrassments. Joaquin Crespo is the present ruler.

There has never been any agreement between Great Britain and Venezuela as to the boundary line between the latter country and British Guiana. The Venezuelan Government represented to ours at Washington that Great Britain was disposed to make encroachments and claim territory that did not by right belong to her.

In December, 1895, President Cleveland sent a strong message to Congress on this subject, in which he took occasion to assert in very plain terms the Monroe Doctrine. The message was received with great favor, and a commission of investigation was appointed by Congress. For a time there was loud talk of war between Great Britain and the United States, but wiser counsels prevailed, and Great Britain furnished the commission with all information in its possession, which could be of service in reaching a just and equitable conclusion. Population of Venezuela, 2,270,000.

BRAZIL

ALONG the sea coast and banks of some of the rivers, besides some extensive tracts in Minas-Geraes, the country has been brought under cultivation; but by far the greater portion of the surface remains in a state of nature. The dense forests furnish almost every variety of useful and ornamental timber, more than one hundred species of palms, logwood, mahogany, Brazil, and numerous other dye-woods, with sassafras, sarsaparilla, ipecacuanha, and a great variety of other drugs. Cocoa is an indigenous product; maize, sugar, coffee, cotton, rice, wheat and tobacco, have been introduced by European culture.

The animal as well as the vegetable products here present the greatest diversity. The diamond mines of Minas-Geraes are at present the most productive known. Other gems, and large quantities of gold, besides silver, copper, iron and platinum, are among the mineral riches of the same province. Manufactures in Brazil are confined to cotton-weaving, tanning, and the production of goods of primary necessity.

Brazil was discovered on the 26th of January, 1500, by the Spaniards under Pinzon, one of the companions of Columbus. In the same year the Portuguese fitted out an expedition to follow up the successful discoveries of Vasco de Gama in the East, and finally took possession of the country in 1640.

In 1808 the royal family of Portugal was expelled by the French and took refuge in Brazil, and the first act of Dom Joao VI., was to open Brazilian ports to foreign commerce. Other wise and liberal measures greatly stimulated the growth of the country. In 1822 he was succeeded by his son who was proclaimed and crowned Emperor as Dom Pedro I. His reign, however, was not a fortunate one. Vexed with the opposition he encountered he abdicated in 1831 in favor of his eldest son Dom Pedro II.

After a brief government by regencies Dom Pedro II. was crowned in 1840. He proved to be a wise and liberal ruler and was popular with his people until the revolutionary disturbances of 1895, when he fled to Europe where he soon afterward died The population of Brazil is 14,000,000, and a good deal of enterprise is shown in developing the resources of the country.

PERU

PERU is, for the most part, of igneous formation and contains a number of active volcanoes, that of Omati being the principal. Earthquakes are frequent and violent. Lying off the coast near Callao are the Chincha Islands, which, with those of Guadafe and Macabo, yield guano in vast quantities. Agriculture is much neglected, although the land is productive of excellent coffee, cocoa, cotton; besides drugs, tobacco, pimento, dyestuffs, etc. The chief articles of export are, after guano, gold, silver, wine, sugar, quinine, wool, etc.

When Pizarro, at the head of a small band of Spanish adventurers, first landed on the shores of Peru, 1532, he found it governed by sovereigns called Incas, who were looked up to by their subjects with awe and veneration; and the inhabitants were distinguished for their mild and polished manners. But the avarice of their European conquerors led to scenes of blood and desolation; the last Inca, Atahualpa, was put to death, and the Peruvians became the victims of the most unheard-of cruelties.

After being for nearly three centuries a Spanish viceroyalty, Peru, in 1821, along with the rest of Hispaño-America, achieved its independence. In 1864, the Spaniards seized the Chincha Islands until Peru should make reparation for injuries inflicted upon Spanish subjects, and held them till 1866 when Peru agreed to pay an indemnity of 60,000,000 reals. This treaty was not ratified, and an alliance entered into with Chile. After war for nearly three years, peace was restored in 1869 by the intervention of the United States. In 1881, war broke out between Peru and Chili, resulting in the defeat of Peru, and the occupation of portions of the country by the Chilean army.

As a Republic.

On June 3, 1886, General Caceres, who had gallantly defended his country against the Chilians from first to last, became constitutional president of Peru. His policy was retrenchment and the protection of the Indian population. Payment of interest of the foreign debt had become impossible. General Caceres served his term of office, and was peacefully succeeded as president, on August 10, 1890, by Colonel Don Remijio Morales Bermudez. Peru is thus slowly ecovering from the disastrous effects of a reat calamity.

The natural resources of the country are eing developed, a greater interest is taken in public affairs, and with a more stable government, supported by the popular will, there is reason to predict a bright future for Peru.

CHILI

THE backbone of this country is found in the Great Cordillerras of the Andes, here attaining an average height of 14,000 feet, many of whose peaks are volcanic, notably that of Aconcagua (the highst Andean summit), which has an altitude of 3,910 feet above the sea. The coast-line resents steep and rocky shores, broken into y some excellent harbors. The rivers and goons are so small as to be undeserving of ention. Climate healthy, taken, as a whole; a carcity of rain is, however, often felt. Earthuakes are of common occurrence; the last reat shock doing much damage in 1868.

Chili is one bed of metals: silver, gold, ad, and iron are found largely and worked; opper, however, is the principal resource of he national wealth, and is mined by Engishmen on an immense scale. Sulphur, ntimony, zinc, manganese, alum, nitre, salt, oal, are other mineral items which influence large exportation. The soil is of varying rtility, fattening most towards the South nd the foothills of the Andes.

Many hard woods are made useful, instead iron, and the fruits of the temperate zone rive excellently. The Chileños have thriven eatly since their emancipation from Spanish le: the bulk of commercial transactions is rried on with Great Britain.

Valparaiso is the chief port, Santiago is the capital; Valdivia, Concepcion, Talca are among the largest and finest towns. The government is formed on the constitution of 1833, and consists of three departments—the executive, legislative and judicial. The first is in the hands of a president, whose tenure of office is five years; the legislature consists of a Senate and Chamber of Deputies. The state religion is the Roman Catholic; other religions are tolerated, but their public exercise is not allowed. Chili, before the Spanish irruption, belonged to the Incas of Peru; in 1535–1540, its whole extent, excepting only Araucania, was conquered by the lieutenants of Pizarro. It thenceforward become a Spanish colony, until 1817, when, after a seven years' war with Spain, the victory of Maypú, gained by General San Martin, secured the independence of the country. At present Chili is the most flourishing of all the Hispaño-American republics.

Climate and Scenery.

The temperature of Chili is remarkably even and pleasant and always cool at nights. In the south it is dry for about eight months in the year and rainy the other four. Vines grow well on the hillsides and are a source of large income. The Andes are almost everywhere visible, covered with perpetual snow. There are many volcanic peaks, mostly extinct. Chili is subject to frequent shocks of earthquake and occasionally to destructive tornadoes. The railway system of Chili is well developed, and in the northern provinces there are several mineral railways belonging to English companies. Th Constitution of Chili is Republican and base upon that of the United States.

UNITED STATES OF COLOMBIA

FORMERLY known as New Granada, the United States of Colombia is one of the most progressive of the South American Republics. It lies in the extreme northwest angle of the continent. On the north is the Caribbean Sea; on the northeast and east, Venezuela; on the southeast and south, Brazil and Ecuador; and on the west, the Pacific and Costa Rica. Its extreme length from north to south is 1000 miles, and the extreme breadth from east to west, 760; on the Isthmus of Panama, however, the breadth is but 28 miles. It has an area estimated at from 480,000 to 520,000 square miles. The population by the last census was 2,880,633. Of these, rathe less than a million are whites, and about a equal number have a large admixture o Indian blood. The remainder are civilize Indians, mulattoes, savage Indians, and th various crosses between whites, Indians an negroes.

The form of government established b the constitution of 1863 resembles in man respects that of the United States. Th president is elected for two years. Th Senate consists of three members from eac of the states, and the lower house of delegates from the several states, each sending a member for every 50,000 inhabitants. Each state has its own legislative and executive officer.

CENTRAL AMERICA

UNDER the head of Central America the countries embraced are the Republics of Guatemala, San Salvador, Honduras, Nicaragua and Costa Rica. They declared their independence September 21, 1821, and separated from the Mexican confederation July 21, 1823. The states made a treaty of union between themselves March 21, 1847. There has been among them since much anarchy and bloodshed, aggravated greatly by the irruption of American filibusters under Kenny and Walker, 1854–5.

In January, 1863, a war began between Guatemala (afterward joined by Nicaragua) and San Salvador (afterward supported by

Honduras). The latter were defeated at Santa Rosa, June 16th, and San Salvador was taken, October 26th; the President of San Salvador, Barrios, fled, and Carrera, the dictator of Guatemala, became predominant over the confederacy. General Barrios, President of Guatemala, attempts the union of the five states, himself to be dictator, opposed by all except Honduras, February. He is defeated and killed in a prolonged battle at Chalchuapa, April 2d; peace with the states signed April 16, 1885.

CUBA

"GEM of the Antilles," as Cuba has long been called, it is at once the largest, most picturesque and inviting of all the West India Islands. Here are scenes of tropical loveliness, plantations with fertile soil and thrifty products, flourishing towns and beautiful harbors, a mixed population comprising all social grades and all degrees of intelligence.

The insurrection going on in Cuba in 1895 and 1896, aroused the sympathies of the American people. Spain sent a large army to beat back the rising tide of patriotic impulse and hold the island still under her domineering rule. Secret expeditions were fitted out from the United States, and the sympathy for the Cuban cause expressed in Congress stirred the hot blood of the proud Castilian and mobs in different parts of Spain assaulted and dishonored the American flag.

Cuba was discovered by Columbus in 1492. The Spanish settlement was consummated in 1512, and the culture of sugar-cane and tobacco introduced about 1580. American filibustering expeditions against the island occurred in 1850–51, both of which ended disastrously to their projectors. Owing to the oppressive rule sanctioned by the home government, the island broke out into revolt in September, 1868, and her people, declaring their independence, formed a so-called National Junta, and appointed Don Manuel Cespedes their commander-in-chief.

Years of Warfare.

A sort of guerrilla warfare was thus initiated, and carried on until 1878, marked by random engagements and resultant massacres on both sides. Since October, 1868, about 90,000 soldiers have been sent to Cuba from Spain, of whom scarcely 15,000 survived. In addition to these, nearly 100,000 were sent in 1895–96.

The soil is fertile in the extreme; forests of vast extent are interspersed over the interior, presenting a vegetation almost unequalled for luxuriance and variety. The climate is hot and variable; hurricanes and shocks of earthquake are frequent. Sugar is the chief staple followed by tobacco, coffee, rice, maize, tropical fruits and vegetables.

The Cobre mines yield large supplies of copper-ore, and coal, bitumen and varieties of marbles and valuable stones are found. Sugar, rum, molasses, cigars and applications of wax are the manufactures. The heroic effort of the Cubans to throw off the yoke of Spain, beginning in 1895, aroused the sympathies of the American people and for a time threatened complications between this country and the government at Madrid. Spain sent over 200,000 troops to Cuba to quell the insurrection, but the heroism displayed by the Cubans prevented the success of the Spanish army. Even the death of the famous Cuban leader, Gen. Antonio Maceo, who was lured into ambush and shot, failed to dispirit the insurgents, who gallantly continued their struggle for independence.

HAWAII
OR
THE SANDWICH ISLANDS

UNUSUAL interest was awakened throughout America by the agitation in Hawaii, or the Sandwich Islands, which resulted in the overthrow of the monarchical government and the establishment of a Republic.

In 1843 the independence of the government was formally guaranteed by the English and French. A line of monarchs followed, the last male member of which was King Kalakaua, who died at the Palace Hotel, in San Francisco, January 20, 1891.

It was his travels and extravagance that caused the financial troubles which led to a change in the form of government. Princess Liliuokalani, who succeeded her brother, proved herself to be an erratic and self-willed ruler. She was constantly at variance with her legislature and advisers, and in January, 1895, attempted to promulgate a new constitution, depriving foreigners of the right of franchise and doing away with the existing House of Nobles, at the same time giving herself power of appointing a new house. This was resisted by the foreign element of the community, who at once appointed a committee of safety consisting of thirteen members, who called a mass meeting of their class, at which twelve or fifteen hundred persons were present.

The Queen Condemned.

That meeting unanimously adopted resolutions condemning the action of the Queen and authorizing a committee to take into further consideration whatever was necessary to protect the public safety. The committee issued a proclamation to the Hawaiian people, formed itself into a provisional government, took possession of the national property and sent commissioners to the United States, inviting this republic to annex the islands A treaty to that end was proposed by President Harrison in February, 1893.

When Mr. Cleveland entered upon his second administration he set this treaty aside and was openly accused of expressing sympathy with the party who favored the retention of the Queen upon the throne. The new form of government, however, has existed, and the islands are now under its control.

The Sandwich Islands are thirteen in number, the eight principal of which are inhabited, viz., Hawaii, Oahu, Maui, Molokai, Lanai, Nihau, Kahoolani and Atuai. Hawaii, the largest of the group, contains the capital. Honolulu has an area of about 4000 square miles, and embraces within its limits two of the largest volcanic mountains in the world—Mouna Loa and Mouna Koa—each with an elevation of about 14,000 feet above the sea. These islands are very fertile, producing grain, coffee, sugar, cocoa, arrowroot, tobacco and fruits; while on their fine pastures great quantities of cattle are reared to supply the needs of merchant-vessels.

The Sandwich Islands constitute a calling place (Honolulu) for the mail-steamers which ply between San Francisco, Japan and China. The inhabitants are of the pure Polynesian (Malay) type. Discovered by Captain Cook in 1778, they were erected into a constitutional monarchy in 1840.

Lying as they do in the middle of the Pacific Ocean, the Hawaiian Islands, though within the tropics, enjoy a fairly temperate climate. Rains, brought by the northeast trade wind, are frequent on the side of the mountains which faces that quarter, but on the other parts of the islands little rain falls, and the sky is generally cloudless. The yearly rainfall at Honolulu, being on the leeward side of Oahu, is under forty inches; that of the islands generally about fifty-four inches.

The soil, whose constituent parts are mainly scoriæ, decomposed lava and sand,

THE GRAND MAUNA LOA IN ACTION.

is generally thin and poor, but at the bases of the mountains and in the valleys there are extensive tracks as fertile as they are beautiful. In Hawaii alone, on the Waimea plains, thousands of sheep of the merino breed find grazing ground; and on most of the islands, while the upland slopes of the mountains are clothed with dense forests, the lower levels spread into grassy plains rich with sugar and rice plantations.

The islands are separated from other lands by a broad expanse and great depth of sea, consequently their natural history has many special features of its own. In the high mountains there are some species of plants akin to those of the American continent. The forest trees are mainly to be found on the windward, being the rainy side of the mountain ranges. Tropical fruits are numerous. There are now, as has been stated, numerous sugar and rice plantations on the islands.

The staple food of the natives consists of *poi*, a kind of thick paste made from the root of the taro plant and raw or dried fish. The only indigenous animals are rats, mice, bats, dogs and hogs, but others have been added since white men came to the islands; cattle, sheep, etc., having been introduced by Vancouver and other navigators. There are large numbers of semi-wild horses in the kingdom, and in some parts of the mountains wild dogs are also to be found.

Reptiles are few, including on land one species of the lizard and a few of the gecko; and the native birds, of which there are nineteen species, are rapidly disappearing, though foreign importations more than supply their place. The archipelago has unfortunately no mineral resources. Coral rock is the material chiefly used for building purposes, and to a less extent, basalt, compact lava and sandstone. There is a large variety of sea-shells, some of which are of exquisite beauty and loveliness.

ELECTRICITY

Latest Discoveries

OF late years the science of electricity has made strides so rapid as to surprise even those who are constantly looking for wonders in scientific discovery. The achievement of Ben Franklin in drawing lightning from the clouds with his kite has been surpassed a thousand fold. The triumphs of Edison, Bell and others read almost like miracles, and whereas it was once supposed that electricity was little else than a destructive force, it has now been caught, tamed, harnessed and made to work for the good of man.

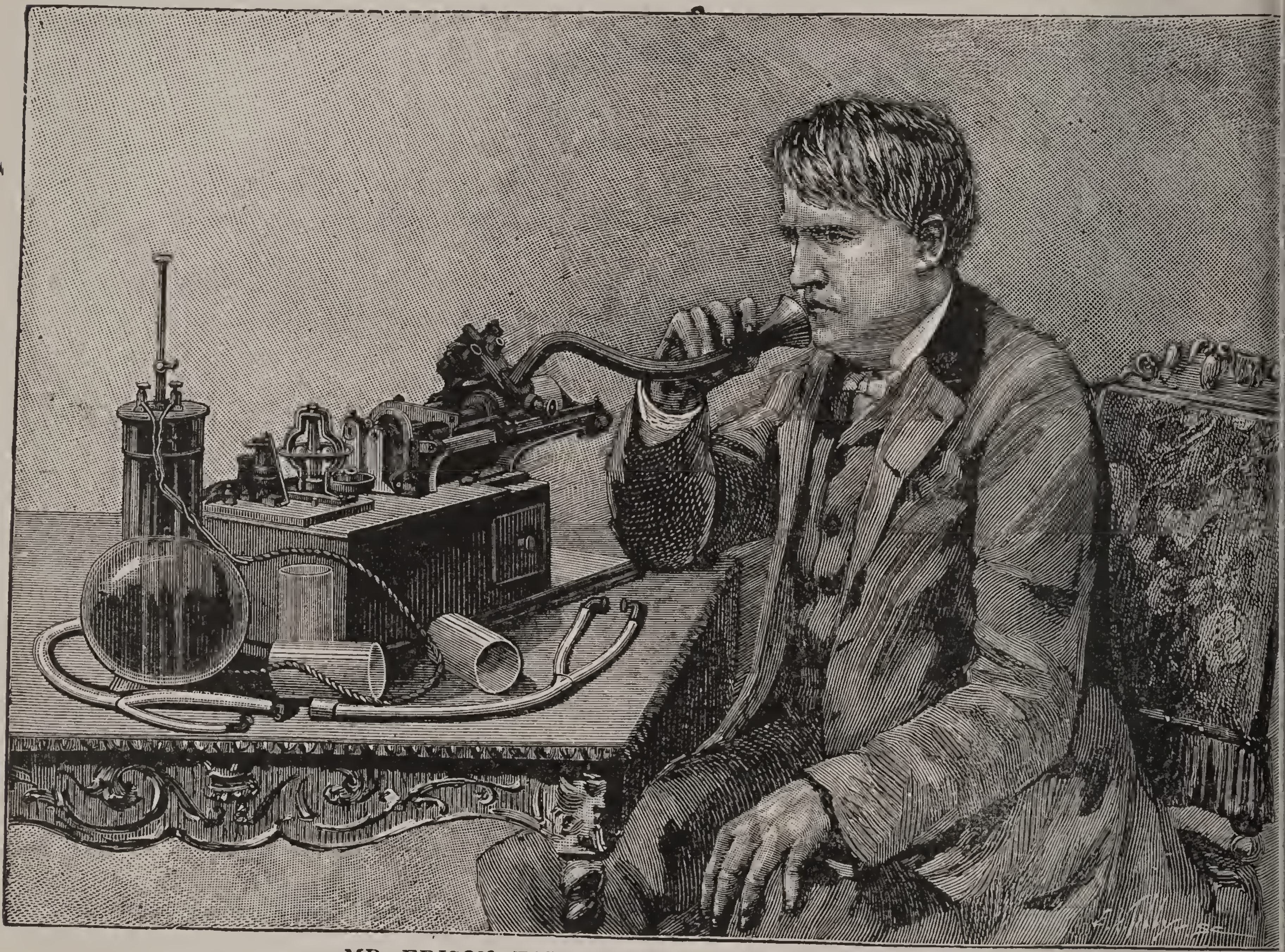
The electric light, illuminating the streets of every city; the telephone, repeating what you say here at a point miles distant; the phonograph, speaking, singing, reproducing sounds of every description; the kinetoscope, exhibiting the motions of actual life; the megaphone, sounding its trumpet blast far beyond the natural reach of the human voice; the application of the mysterious force of electricity to the uses of ordinary travel, such as street cars, and even railways hitherto operated by steam—these are only a few of the wonderful inventions and applications of the subtle agent which has suddenly leaped from the clouds and seems to be almost transforming the face of the earth.

If a stick of sealing-wax is rubbed vigorously with a woolen cloth, it will be found capable of attracting small shreds of paper. This is the simplest experiment in electricity. Many other substances, such as resin, vulcanite, glass, etc., can be made to show the same phenomenon. To obtain the best effect with any given substance a particular rubber must be chosen. For example, a cat's fur, slightly warmed, is every efficient in electrifying vulcanite or resin, while silk, amongst simple substances should be used to excite glass.

A Powerful Agent.

Thus, in a simple manner, we discover in nature the existence of an invisible force. Its power may be said to be unlimited. It can shatter the stateliest granite column. It can rive in twain the brawniest oak. It can destroy instantly every form of animal life. Not until within a comparatively recent period has this force been mastered and made to work out beneficent results.

In a general way it may be said that in using electricity it is produced by friction, and stored as water might be in a tank and then the force is turned on when the pow is required. All else relates to the construction of the necessary apparatus.



MR. EDISON TALKING INTO THE PHONOGRAPH.

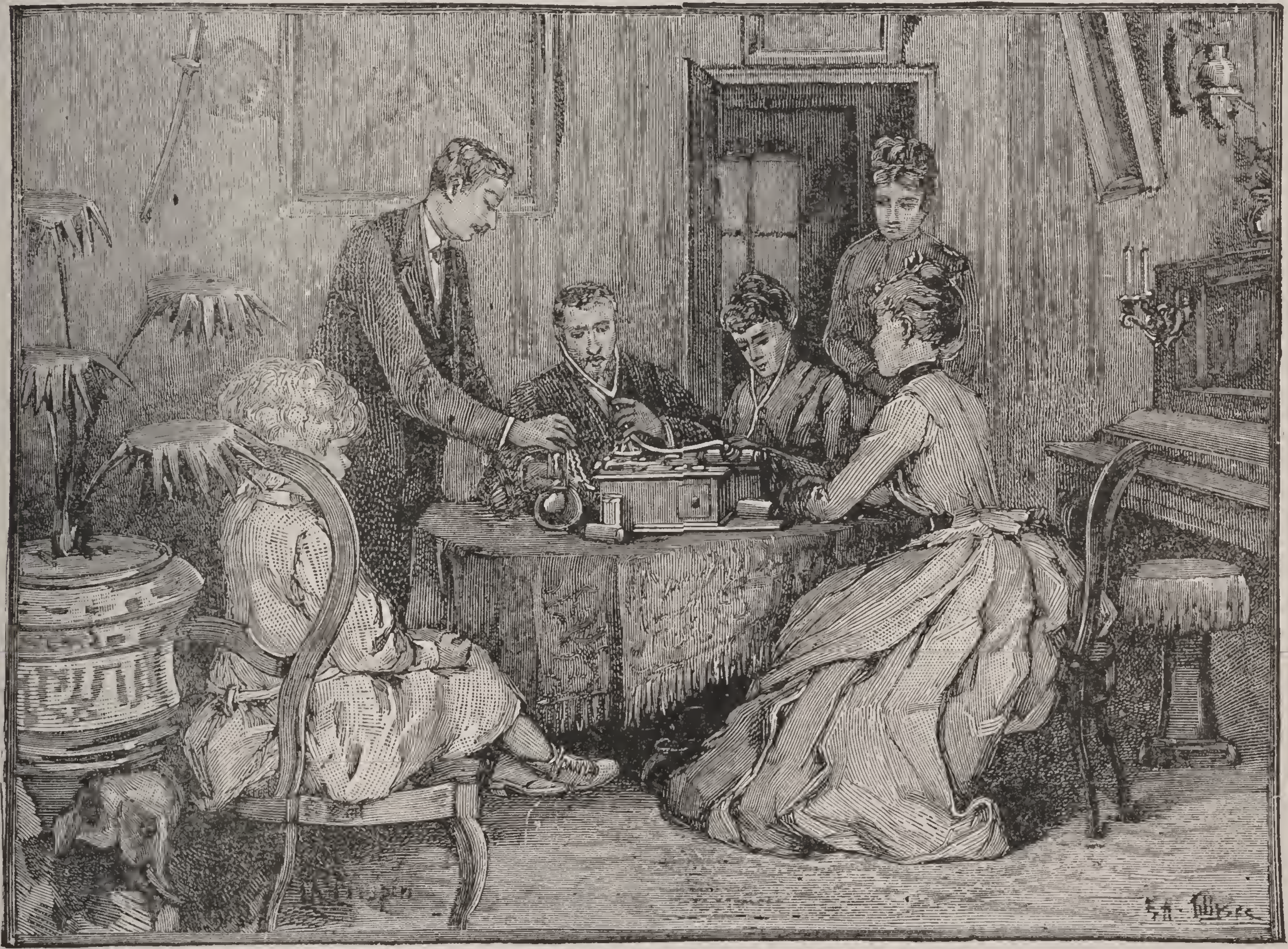
The Phonograph

VERY few even of those who have heard the dulcet strains of some sweet song from the depths of the phonograph, understand in the least the mechanism by which the sounds are produced. The explanation is as follows : The phonograph is composed of a metal cylinder covered with a thin layer of wax, on which a pointed pen inscribes tracings, corresponding to the vibrations caught by a membrane placed on top of the pen.

The wax-coated cylinder is rapidly revolved by means of an electric battery, and as one speaks in front of the membrane, the cylinder advances slowly in a horizonta position, at the same time revolving rapidly.

The membrane vibrates much or little according to the sounds emitted by the operator. The pen moves according to the vibrations, and peculiar, almost imperceptible tracings on the wax are the result. On top of the membrane is a funnel into which the operator speaks. The picture shows Mr. Edison talking into this funnel.

To obtain reproductions of the sounds as inscribed on the wax cylinder, it is replaced in its original position. Another pen of different construction than the first is put into play, and in a most exact and delicate manner transfers to the wax of another cylinder the tracings on the first. The funnel is replaced by a rubber tube having two, four or six branches, according to the number of the auditors, and the tubes are applied to their ears, as in the illustration.


LISTENING TO SOUNDS FROM THE PHONOGRAPH.

Not only can we hear the sounds from the same phonograph into which they are spoken, but the cylinders may be preserved and taken wherever we wish; by placing them again in a mechanism as above described, the original sounds may be reproduced.

In this manner are made the phonographs found in many hotels and public places. The first cylinder is carefully made as above described, and duplicated as many times as required. Each cylinder is then placed in a case, and the phonograph may be put in use when required.

The new and perfected Edison phonograph has already gone into very general use and many thousands are distributed in American business offices, where they facilitate correspondence in a variety of ways. They are also employed by stenographers as a help in the transcription of their shorthand notes. Heretofore these notes have been slowly dictated to amanuenses, but they are now frequently read off to a phonograph and then written out at leisure. The phonograph is, however, being used for direct stenographic work and it reported verbatim forty thousand words of discussion at one presidential convention, the words being quietly repeated into the machine by the reporter as quickly as they were uttered by the various speakers. A large number of machines are in use by actors, clergymen, musicians, reciters and others, to improve their elocution and singing. It is also worthy of note that voice records remain of distinguished men, who "being dead, yet speak."

Why the Wheels Go Round

FEW people understand the principle upon which street cars are propelled by what is known as the Trolley system. Most people know that a power-house, a trolley wire and a motor are necessary to the system, but of the functions of the various parts they have but a faint conception. "What makes the wheels go round" is a mystery, yet it can be easily explained.

First, there are boilers to generate steam for the engines, and the engines in turn drive the generators, which produce the mysterious power or "juice," as it is commonly called by the electricians, for the motors in the cars. It is obvious, therefore, that the prime factor in the operation of an electric railway is steam, the electric current acting only as a convenient and subtle agent for transmitting and distributing the power.

The voltage of an electric circuit corresponds to the pressure in water pipes. The voltage of a dynamo depends on three conditions, namely, the speed of revolution of the armature, the number of coils of wire in the armature, and the strength of the magnetic field. For incandescent lighting, 110 volts are generally used, while for railways the pressure is 500 volts.

The current from the generator in the power-house goes to the switchboard, where it passes through an ammeter, which indicates the amount of current being given out, through a switch, by means of which the current may be shut off at will, and through a circuit-breaker, which opens the circuit automatically in case of a short circuit on the line or an overload.

From this point one side of the circuit is composed of the feeder (heavy insulated copper cables) and the other side of the ground or return. Formerly the rails alone connected with the ground formed the return, but owing to various causes, among them the electrolytic action on water and gas pipes, the modern practice is to supplement the rails with heavy copper wires, which afford an easier path for the current than the pipes. The feeders run parallel with the tracks, either overhead or underground, as the case may be, and at points along the line are "tapped" or connected to the trolley wire.

How the Current is Applied.

Each car is provided with two motors, the armatures or revolving parts of which are connected to the axles of the cars. A motor is made almost exactly like a generator. In fact, if driven by an engine, it will generate an electric current the same as the generator. Therefore, when the power of the engine drives the armature of the generator in the power house, causing it to give out a current, this current supplied to the motor causes its armature to revolve and develop the same mechanical power originally required to drive the generator, eliminating, of ourse, the various losses due to friction and eakage.

Next the current goes through the motor. Vhile delivering a lecture before an audince of unskilled laymen, a well-known lectrical engineer was asked how the curent gets into the car, and he replied : " The onductor brings it in." Of course he ıeant the copper conductor running down ıe trolley pole, and not the innocent fareıker and bell-ringer.

Practical Illustration.

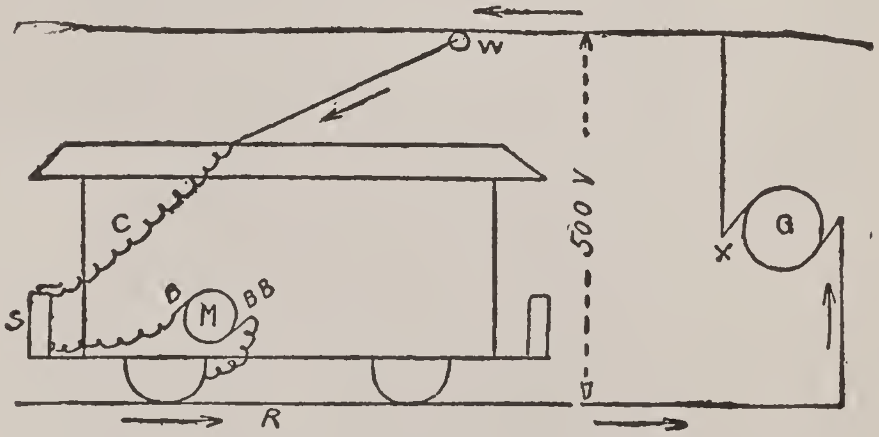
The method of allowing the current to ıss through the motor in the car is illusated in the annexed sketch. The top line the trolley wire and R shows the rails. etween these there is maintained a pressure 500 volts. W is the trolley wheel in ntact with the trolley wire, and attached the trolley pole. In electrical contact ith the trolley wheel and running through e trolley pole is an insulated copper wire This wire is shown in the sketch, but is, course, concealed in the car. It runs to e familiar metal case on the platform. ıis case contains the controller, which consts of a system of coils of wire, resistance ranged so that the speed of the motors ay be varied by the motorman by turning e switch or controller handle to different oints.

The controller is also so constructed that turning another handle the motor will volve in the opposite direction, backing the r. The coils are so arranged that the two otors may be thrown in parallel or in sries, which means in the first case that ech motor completes a circuit by itself, hile in the second case the same current ws through both motors. Only one otor is shown in the sketch, which is sfficient to illustrate the principle

The direction of flow is shown by the arrow heads. The current from the generator G in the power house flows to the feeders and trolley wire. From the trolley wire it flows through the trolley wheel W, through the wire C in trolley pole to the controller S, where it is turned on or off by means of the controller handle. From here it flows through another wire to the brush B of the motor M, through the armature of the motor and out at the brush B B, then through a wire into the car wheel to the rail R, which carries the current back to the negative brush of the generator G.

Great Motive Power.

The flashing often seen at the wheels of an electric car is caused by imperfect contact between the wheel and rail, and is due often to dust on the rail or similar causes.



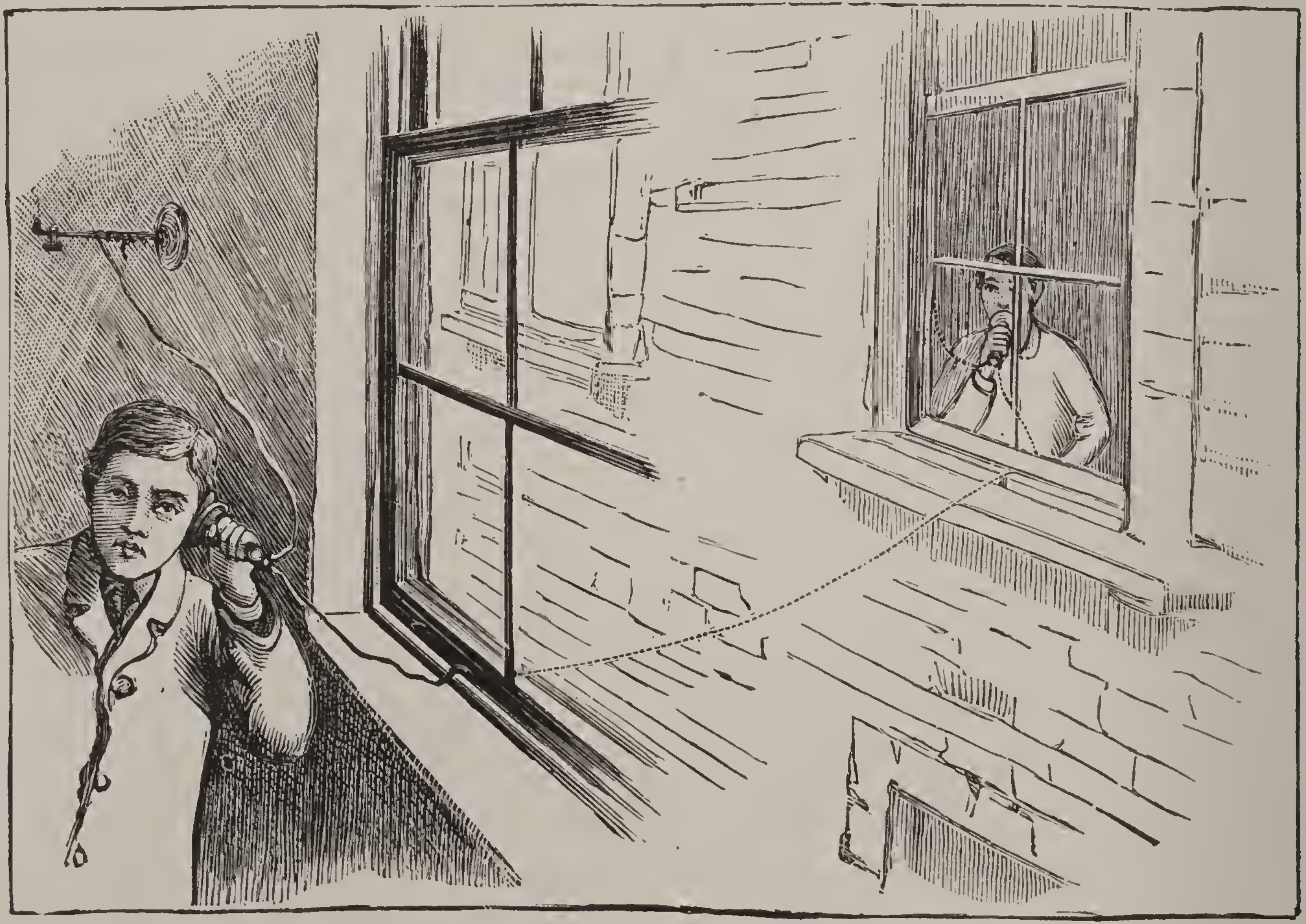
Already the electric current has been applied to ordinary railroad traffic. The most advanced thought on this subject points to the time not far distant when electricity will be the great motive power superseding steam. Its advantages are evident at a glance. The speed which it is capable of furnishing, the absence of annoying smoke, the facility with which it can be operated, all indicate that its practical results will be of great service, will form an epoch in scientific discovery and constitute a new mode of carrying on those great industries which are dependent upon a motive power, at once efficient and easily manipulated.

Successful efforts have been made to place the conducting wires in the earth, thus avoiding the danger of having them over head. The advantage of this is apparent, and being accomplished, we shall have the most complete motive power ever brought into use.

The achievements thus far in electrical science are among the greatest triumphs the age. These have come rapidly and vivid succession. The most acute thoug and inventive genius have been displayed the practical application of this greatest an most marvelous of all the agents treasure in the storehouse of nature.

The Telephone

SUPPOSE you want to communicate with your neighbor across the street: a wire is stretched between the two houses and connected to the two telephones; from the remaining binding screw of each telephone wires are conducted, say, to the gas-pipe, and the *bare* wire wound round the *bare* pipe, so that there may be metallic contact. Conversation may now be carried on as in the annexed figure. For short distances you will perhaps find least difficulty by using a double wire instead of connecting to the brass pipe, as the joints of the latter sometimes intercept altogether the flow of electricity.



COMMUNICATING BY TELEPHONE.

Philosophy of the Telephone.

We already know that when sound-wave impinge on anything like the ferrotyp plate of a telephone, such a plate is made t vibrate; and a piece of iron like this vibrating in the neighborhood of a magnet wi considerably disturb its lines of force. these fluctuating lines of force, therefor are crossed by rings of wire, currents electricity will be generated in the wir

And so it is every time one speaks into a elephone, for electricity is generated and ent along the wire to the other end, in a direction which varies with the "in-and-out" action of the telephone plate.

You will clearly see, then, that electricity s produced at the *transmitting* end. What happens where the listener has his attentive ear to the telephone? The electricity travels round the coil of the *receiving* telephone, and varies the magnetism of the bar within it, which in its turn varies its attraction upon the ferrotype plate; the ferrotype plate begins to vibrate, and it vibrates in such a way as to reproduce the sounds which were spoken into the transmitting end.

Transmission of Sound.

That we should ever be able to "talk by lightning" was not dreamed of for many years after the discovery of the telegraph proved that messages could be transmitted through motions of the electric instrument producing signs. Now we do not have to write the communication, but can speak to a person many miles away, and converse almost as freely as we would with one by our side in the same room.

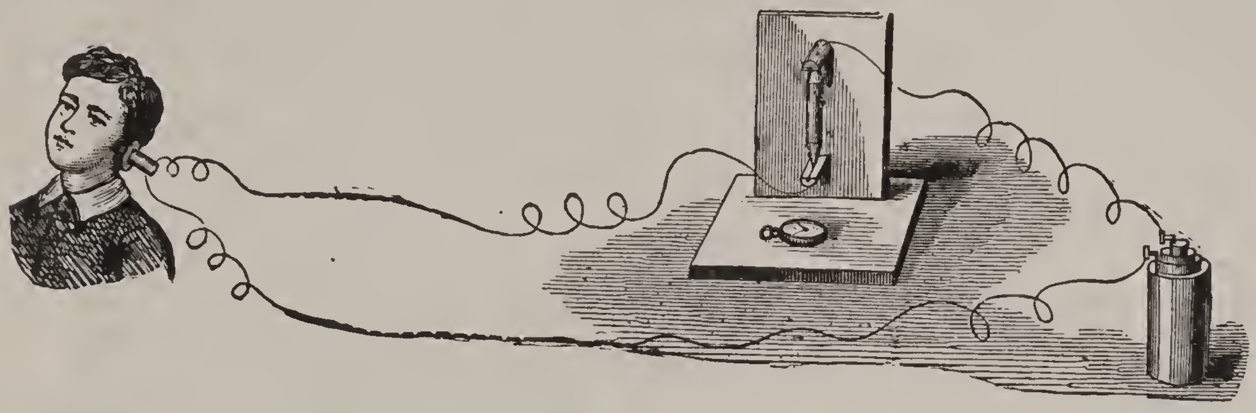
The principle is that of the transmission of sound. The air, the water, woods, metals are all conductors, but it has been proved that a metallic conductor, a telegraphic wire, with electricity for the driving force, is the best transmitter ever discovered. The telephone has rapidly sprung into use, and has become a necessity in our large towns, where, on account of the pressure of business, time is money and moments count for as much as hours did once. A man of business can call up his neighbor, who is near or his customer miles away, and in a brief time the matter in hand is disposed of.

The description of the instrument is as follows: An electro-magnet or spool of copper wire is fastened to the end of a steel bar which has been charged with magnetism; the ends of the wire are carried down to the outer part of the rubber case, and connected by screws to the line wire.

In front of the spool, and a little way from the end of the bar magnet, a piece of "ferrotype" sheet iron is placed. When a current of electricity is sent into the telephone and through the spool of wire, thn sheet iron plate is caused to vibrate in unisoe with the breaking of the current, by reason of the alternate attractions and cessations of attraction of the plate by the electro-magnet, and a sound is produced, as already explained.

THE BELL TELEPHONE.

The microphone is an instrument for intensifying and making audible very feeble sounds. It produces its effects by the changes of intensity in an electric current, occasioned by variations in the contact resistance of conducting bodies. It has always been known that many solids are excellent conductors of sound. One of the little experiments of boyhood is for one lad to hold his head under water while another, not far away, strikes two stones together under the surface. The water coming in close contact with the ear, and being a good conductor o sound, produces something in the nature o a shock, quite as startling as would be th firing of a pistol near one's head. This, i must be understood, is not the principle o the microphone or telephone. There must be conductor for the electri current, but the curren itself is indispensable.



THE MICROPHONE.

Thus, not only by th telegraph can words b transmitted, but also in more direct way, and eve the tones of the human voice can be distinguished. It is literally true that we talk b lightning, and can speak to a listener a thousand miles away. Our age finds in electricity its most marvelous field of discovery.

The Electric Light

THE problem, long-studied by scientists, of procuring from this subtle force in nature a light that would be of service and outstrip all other means of illumination has been solved, and in every town now, of any dimensions, electric lighting is in successful operation.

Pure incandescence is represented by four systems—Edison, Maxim, Swan and Lane Fox. The light from this description of lamp is from the heating of a carbon filament due to its high resistance to the passage of the current. This filament is surrounded by a hermetically sealed glass bulb from which all the air has been extracted.

The life of the lamp depends greatly as to how carefully this process has been carried on. It is not sufficient only to extract the air when the lamp is cold, but the process must be carried on when the lamp is burning, and the exhaustion must be continuous for some time. These lamps can b worked either by an alternating or a continuous current machine; and, unlike those of partial incandescence, require a tension current, while the former work best with a quantity one.

The Edison lamp is generally considered to be the pioneer of this system of illumination. Whether this be so or not the name of the inventor has been for a considerable time associated with lighting by incandescence, although his early experiments were with a lamp containing a metallic substance. The lamp consists of a blown glass globe containing a very fine filament made from the fibre of bamboo carbonized. The length is fixed according to the resistance required.

Each end of the filament is nipped between a miniature vise composed of platinu connected with the terminals of the lamp. These are fixed in an insulated socket, which also holds the glass bulb. The socket is furnished with a screw which fits into a projection on the bracket or holder, so that the act of screwing in the lamp makes the necessary connection with the conducting wires.

THE VOLTAIC ARC.

By turning a tap the lamp can be removed without interrupting the passage of the current. The maximum duration of the lamp is stated to be twelve hundred hours. The chief feature of the Edison system is the manner in which the inventor distributes the current from a main generator of his own design, which is always used with this system of lighting.

The engraving on next page is a perfect representation of Edison's latest electric lamp, with its various parts shown in detail. Fig. 1 shows the carbon horseshoe ready for use, full size; Fig. 2 represents the horseshoe when just cut from the Bristol board, illustrating, by its comparison with Fig. 1, the enormous shrinkage it undergoes during the process of carbonization.

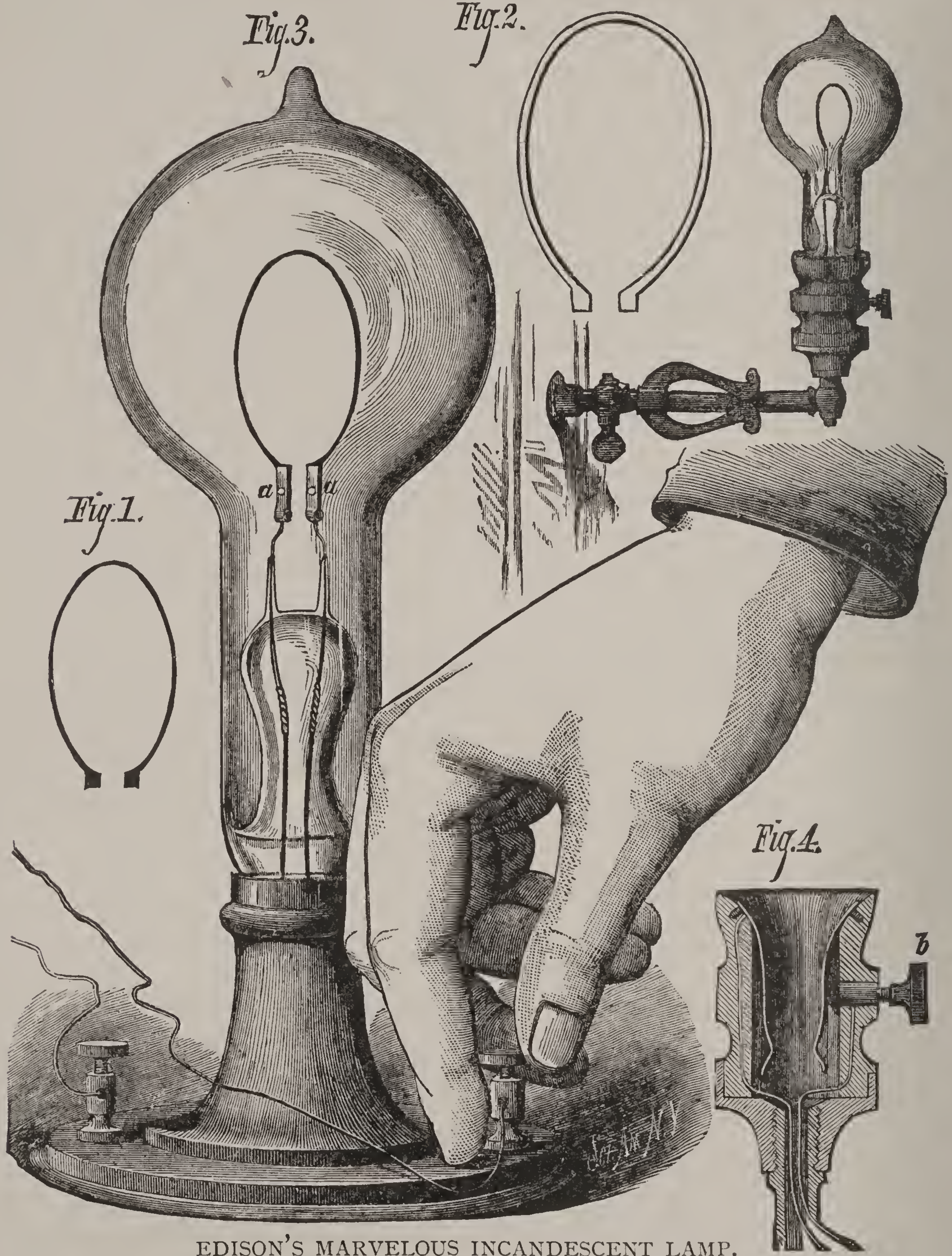
The only index to the completion of this process is the crackling of the oxide formed on the exterior of the iron boxes in which the horseshoes are placed. After their removal from the boxes the carbons are placed between the jaws of small platinum vises, *a*, *a*, supported on thin platinum wires blown in the glass base and forming the electrodes. The resistance of the slender horseshoe is one hundred ohms.; and while the lamp shown, Fig. 3, is intended to give a light equivalent to a single four-foot gas jet, it may be forced to give a light equal to eight or ten of such jets.

The carbons are so tough that one of them has been subjected to the test of applying and removing the electric current a number of times equivalent to thirty-six years of actual daily use, and without being in the least impaired. The horseshoe form of the carbon has a great advantage over the voltaic arc, the light being softer, more diffused and less trying to the eyes. It is, besides, perfectly uniform and steady. The lamps are connected in multiple arc, that is, the two wires leading from the electrical generator run parallel to each other, and the lamps are placed between them and are connected with each wire.

Easily Handled.

The entire lighting apparatus of any building consists in the lamps and a few wires. The lamp in its present form is as simple and as easily handled as a candle, and can be taken from its socket and replaced even while the current is on. The construction of this socket is shown in Fig. 4. The lamp has, attached to its electrodes, slips of copper which are bent up against the sides of the glass, touching two springs at opposite sides of the socket. One of these springs is connected with one of the electrical conductors; the other merely touches the copper strip, and does not form a part of the electrical conductor until it is touched by the thumb-screw, *b*, this latter being connected with the second electrical conducting wire.

To start the light it is only necessary to turn the screw, *b*, till it touches the spring. To stop the light the screw is turned in the reverse direction. From this it is obvious that an electric lamp is more easily managed than a gas burner, as it requires neither lighting nor regulating; while it is equally plain that these lamps, having withstood the test of time, the inventor has solved a profound problem, and become one of the world's great benefactors.



EDISON'S MARVELOUS INCANDESCENT LAMP.

Edison's Mimeograph.

The Mimeograph was designed and patented by Mr. Thomas A. Edison. In designing the mimeograph, Mr. Edison took as his fundamental principle the stylus or point, the writing implement of man since the art was first invented. It is the natural tool by which the hand can trace characters, and it is this stylus or point, peculiar to the mimeograph in the line of duplicating machines, which created for it such a decided and permanent popularity.

With the stylus as first principle, Mr.

dison built the mimeograph, with reference › the stylus as the writing instrument, degning the other parts to meet its requireents.

The mimeograph belongs to the stencil ass of duplicating machines, which, as is ell known, is the best type of such devices. he stencil is made on a sheet of fine ecially manufactured tissue paper, which is ated on one side with a film of sensitive aterial.

Fine Steel Plate.

The cutting agent of the mimeograph is a late of fine tool steel, upon which are cut tersecting corrugations, numbering two undred to the inch, thus making on the late a surface of small sharp points, so fine ıd minute that a magnifying glass is reuired to bring them distinctly to the eye; pon this steel plate, which is imbedded in table or plate of polished slate, the sheet f sensitive paper is placed, and the stencil is ormed by writing on the paper over the eel plate with the stylus, which is made of empered steel and nickel plated.

As the steel point of the stylus (which is round to a round or smooth point) passes ver the sensitive paper, it presses the paper gainst and upon the steel plate, and the fine harp points puncture it from the under ide making a series of orifices or holes, each ne a two-hundredth part of an inch from e next, in the lines of the writing.

The point of the stylus, although tapered o the size of a nicely sharpened lead pencil, eally rests on three of the cutting points of he writing plate (as the corrugated steel is ermed) at one time.

It thus glides easily and smoothly over he roughened surface without tearing the aper, but still with just enough friction to nake the act of writing a pleasant operation, almost identical to that done by a medium hard lead pencil.

After the stencil is made, the next operation is to prepare the stencil sheet (as the sensitive paper is now called) for the purpose of printing copies of which it is the original.

The ink is squeezed from its collapsible tube upon a slate used for that purpose, and a hand roller made of a peculiar composition is passed over it, spreading the ink evenly over the slate, and at the same time charging the roller.

The sheet of paper upon which the copy is to be printed, is placed upon a blotter resting on the baseboard beneath the stencil sheet, and the ink roller is passed over the stencil sheet, forcing the ink through the perforations and upon the impression paper, thus making a print. This last operation is repeated until the required number of copies are obtained.

The *modus operandi* just described is for the purpose of reduplicating autographic matter.

Edison's Kinetoscope.

Perhaps the simplest statement of the principle upon which this instrument is constructed, would be to call it the reproduction of motion. The observer looks through a glass into a small cabinet and appears to see living figures. These may be men, or animals, and they are in action. Just as the phonograph makes a faithful record of sounds, so the kinetoscope gives us a reproduction of the actions of living creatures.

The following is what Mr. Edison himself says on the subject: "In the year 1887 the idea occurred to me that it was possible to devise an instrument which should do for the eye what the phonograph does for the ear, and that by a combination of the two all motion and sound could be recorded and reproduced simultaneously. This idea, the germ of which came from the little toy called the zoetrope, and the work of Muybridge, Marie and others, has now been accomplished, so that every change of facial expression can be recorded and reproduced life size. The kinetoscope is only a small model illustrating the present stage of progress, but with each succeeding month new possibilities are brought into view.

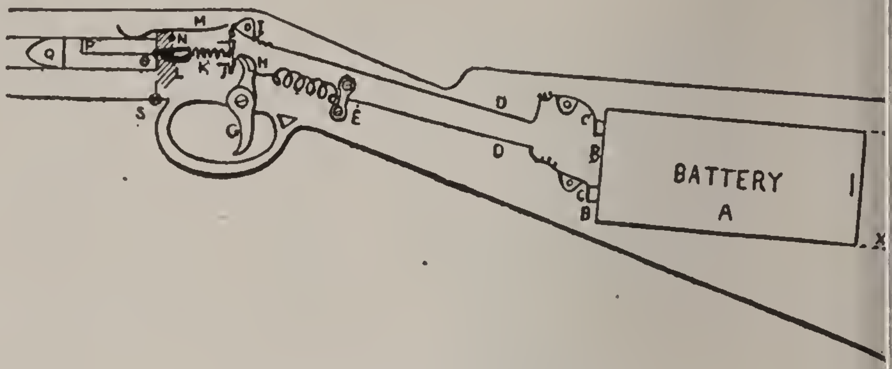
"I believe that in coming years by my own work and that of others, who will doubtless enter the field, grand opera can be given at the Metropolitan Opera House at New York, without any material change from the original, and with artists and musicians long since dead."

After the instrument was perfected the succession of pictures was found to be rapid, and those instruments exhibited in nearly all our towns are found to work most satisfactorily.

Electric Rifles.

The practice of firing big guns by electricity is already well established, but hitherto no practical attempt has been made to explode the shells of small arms electrically. An electric rifle has been designed in which it is sought to carry out this principle.

The source of the current is a battery A, which is fitted into the stock either from the side or from the ends. The holes B B are connected to springs C C, from which the wires D D run respectively to a spring M, bolted at I to the lock plate, and to the insulated hammer H fixed on the upper part of the trigger G. Q is the shell containing an insulated pin, the head of which O projects beyond the base of the shell. If necessary, two pins can be placed parallel with each other and insulated until their points nearly meet. Between the base of the cartridge and the hammer is a pin K encircl by a spring and riveted into a cross plate at one end, the other end being fitted into insulated thimble L, the point of whi



ELECTRIC RIFLE.

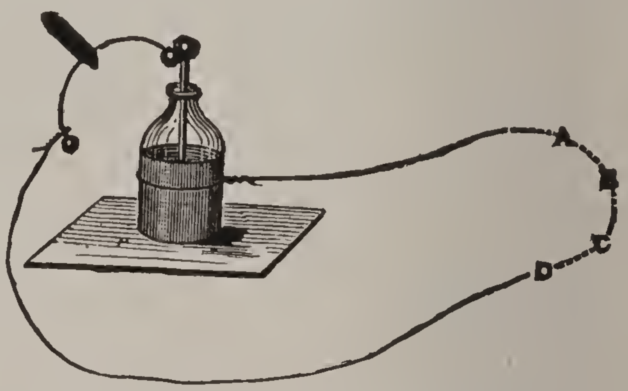
nearly touches the shell pin head O. Whe the cartridge has been inserted and the gu closed, the spring M rests on the metal ba of the cartridge.

As the trigger is pulled, the hamm strikes the plate J forcing the point of th thimble L into contact with the projectin end O of the cartridge pin. An arc is estal lished at P O, which explodes the conten of the cartridge.

The point of the firing pin P can be place anywhere within the explosive powder c the cartridge, but by extending it near th bullet, as shown in the illustration, a mor effective explosion of the powder is secured

To Get an Electric Shock.

Suppose there are four persons (A, B, C and D) who are desirous of receiving th shock. A wire is wound round the oute

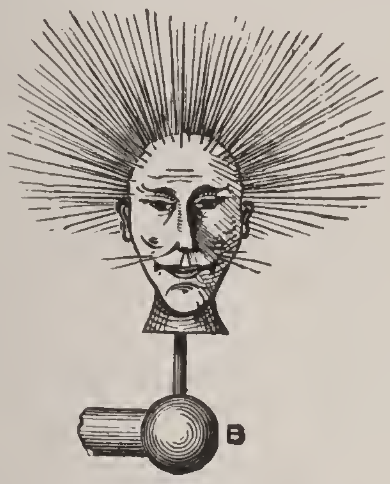


GIVING A SHOCK TO PEOPLE.

coating of the Leyden jar; the jar is then charged and placed on the table. The four persons join hands, and while A holds the end of the wire leading from the outer coating of the jar, D has also hold of a wire which is in communication with one of the knobs of a discharger. You now seize the insulating handle of the discharger and bring *one* knob only in contact with the knob of the Leyden jar. A shock will be experienced by the four persons, and unless A be cautioned he may, by his sudden antics, pull the jar off the table.

A Singular Effect.

There are many effects, some of them odd and humorous, which can be produced by electricity. For example, place the figure of a human head, with flowing hair, on the end of a rod stuck into the prime conductor. Immediately it becomes charged with electricity its hair stands on end as if it had received a terrible fright.



AN ELECTRICAL FRIGHT.

How Ocean Cables Are Made.

The cable consists first of a core comprising the conductor made of a strand of copper wires, and the insulating covering of gutta percha or India rubber to prevent leakage of the electric current. Outside of this is a layer of tanned jute yarn. This protects the gutta percha or rubber from the sheathing of steel wires which is the next covering, and which varies according to the depth of water in which the cable is to be laid. Outside of this again is a combination of jute yarn and a bituminous mixture. This is applied in a melted condition from a spout as the cable is passed underneath. During the time the cable is being manufactured and laid, electrical tests are taken to insure perfection.

The finished cable is then kept coiled in large circular iron tanks under water. Similar tanks are in the cable ship, and when at sea the lengths are paid out over a large pulley at the stern. The speed is regulated by several retarding wheels and a brake wheel, over and under which the cable has to pass. The strain to which it is subjected at any given moment is indicated by a dynamometer.

Method of Laying.

When all the cable has been paid out, the end is carefully sealed up and attached to a stout rope. This is lowered to the bottom of the sea and the other end of the rope is attached to a buoy which is to mark the end of the cable, which is usually laid in three sections. One laid, for instance, was started from Waterville and laid out to a given point in deep water. The second section was laid from Canso, on the American side, also into deep water, after which the fifteen hundred intervening miles were laid and all three spliced together.

But the laying of a cable is as nothing to the difficulty experienced in repairing it, especially if the work has to be done during rough weather, when the sea runs mountains high and the gales continually blow the ship away from the scene of operations. Sometimes the cable is found buried in sand several thousand fathoms from the surface of the water. When it is only a flaw and the strands themselves are whole the task of repairing it is slight; but when the cable has actually parted and both ends have to be found and again spliced together, it is sometimes a work of several months.

Famous Gems

A ROYAL gift is now in the hands of the Pope of Rome. It is a diamond, the size of which has never been equalled in the whole world, unless the story of the Braganza diamond was true. That diamond, it was said, weighed in the rough 1680 carats. The loss in cutting generally comes to one-half or a little less than two-thirds. This would make the gem weigh about 560 carats when cut. The stone was said to be worth £3,000,000 sterling or $15,000,000. What became of the Braganza is not known. It is probably now famous after successive cuttings and various owners under a name which has no association with the original finder.

Very little is yet known of the immense diamond now the property of the Pope. The meagre cable despatches from Rome said that it was found by an African chief in the mines at Jagersfontein, and is said to be the largest known, weighing in the rough 971 carats. It came into the possession of the President of the Transvaal Republic, who sent it to the Pope. It is described as being of a bluish white cast and practically perfect, the only blemish being a tiny spot, invisible to the naked eye.

What the value of this stone is can hardly be estimated. When cut the weight of the stone will be about 450 carats, and, if perfect, it should be worth the gigantic sum of $20,000,000. Large South African diamonds have not the same value that the Brazilian stones have. An eighty-carat gem is a common find in the African mines, but most of the large stones discovered there are yellow in color, which largely depreciates the value. Still, from its gigantic size, the Pope's diamond has at once taken a foremost place among the great gems of the world, and two thousand years from now it will probably be talked and written about just as the Koh-i-noor is to-day.

The Queen of Jewels.

The most valuable cut stone in the world is the King of Portugal's Brazil diamond, which weighs 525 carats and is worth, if genuine, the magnificent sum of $28,000,000.

The Koh-i-noor or mountain of light, owned by Queen Victoria, is worth $3,500,000. This brilliant is 2000 years old. The Hindoos trace it back to the time of the god Krischna. It was certainly in the treasury of Delhi, and was taken in the conquest of that city by Ala-ed-Din. From him it came into the possession of the Sultan Baber, of the Mogul dynasty, in 1526. This prince esteemed its worth at the sum which it would take to maintain the whole world for a single day. The jewel was seen by Tavernier among the jewels of Aurengzebe, but it had been reduced by the unskillful cutting of Hortensio Borgio from 793 carats to 186, the weight it possessed at the Paris Exhibition of 1851.

The Emperor Indignant.

The Emperor Aurengzebe not only refused to pay Borgio for the cutting, so incensed was he at the great loss, but he confiscated all of his property, and was with great difficulty prevented from cutting off his head.

Nadir Shah, the conqueror of India, possessed himself of the stone by a trick; then it passed from his descendants into the possession of Achmed Shah, whose son, Shah Sujah, was forced, in his turn, to give the prize to Runjeet Singh. After the capture of Lahore, at the time of the Sikh mutiny, it fell into the hands of the British troops, who presented it to Queen Victoria in 1850.

The brilliant had an irregular form, with several hollows at the base and at the sides, and there were several fissures on the surface. After great discussion among scientists the stone was intrusted to Mr. Costen, of Amsterdam, for recutting, and the results were marvelous. Little was lost in size comparatively, and, instead of being a lusterless mass little better than a piece of rock crystal, it is now a matchless, fire-flashing brilliant weighing 10 1-16 carats, and forms a valuable part of the crown jewels of England.

One of the diamond wonders of the world is the Orloff, which is set in the scepter of the Czars of Russia. It weighs 194¼ carats. Like the Koh-i-noor it has the under side flat and is rose cut. The diamond is supposed to have formed one of the eyes of an idol in a Brahmin temple. It is also said to have been set in the famous peacock throne of Nadir Shah.

Be its origin what it may, it is certain that it was stolen by a Frenchman, who sold it in Malabar for £28,000. It was purchased by the Armenian Schaffras, who, in turn, sold it in the year 1774 to the Empress Catharine II. of Russia for 450,000 roubles, a pension of 20,000 roubles and a patent of nobility. Another beautiful diamond belonging among the Russian crown jewels is the Shah, which weighs 86 carats and is absolutely perfect, a mass of fire and brilliancy. It was presented to the Emperor of Russia by Cosroes, the son of Abbas Mirza.

Famous French Gem.

Among the other famous diamonds is the Regent or Pitt diamond, which forms part of the French crown jewels. Its weight is 136¾ carats, and its estimated worth to-day is $1,000,000. It was bought by the Duke of Orleans, then Regent of France, of Pitt, the Governor of Fort George, in the year 1717, for £135,000, in the rough stone weighing 410 carats, and the cutting cost £2000. Pitt published a pamphlet declaring that he purchased the stone in Golconda of Jamelchund, a Hindo merchant. This diamond was stolen from the Garde Meuble in 1792, but was mysteriously restored. Its final cutting occupied two years. and cost £3500.

The Emperor Napoleon I. had it set in the hilt of his sword of state, and it was captured by the Prussians at Waterloo. This wonderful stone was shown at the French Exhibition in 1855.

The Empress Eugenie has a superb stone, absolutely perfect, which weighs 51 carats; it is set as a pendant, and was purchased for her by Napoleon III.

The Florentine belongs to the Emperor of Austria; it weighs 139½ carats, and it is worth $500,000. It is yellowish in color and is rather thickly covered with facets like a rose diamond. In shape it is pointed top and bottom.

Disappeared and Returned.

The noted Sancy diamond is almond-shaped; it weighs 53½ carats; it was found on the body of the Duke of Burgundy in 1479 and was bought by the King of Portugal. After many changes it finally came to James II. of England, who sold it to Louis XIV. for £25,000. It disappeared, with many other valuable things, in the dark days of the Revolution, and some years later became by purchase the property of Prince Paul Demidoff.

After the battle of Culloden the city of London purchased a magnificent diamond at a cost of $57,000 and presented it to the Duke of Cumberland. It was known thereafter as the Cumberland diamond; its weight is 32 carats. It was one of the the stones claimed by the crown of Holland.

There are perhaps 8,000 dealers in diamonds in the world who carry in their stock stones worth perhaps $350,000,000. The remainder are in the hands of private individuals. There is always something fascinating about the subject of diamonds, and rich and poor like to read about precious stones. It is estimated that during the last twenty-five years the American people have paid duty on at least $180,000,000 worth of diamonds and other precious stones. In 1893 alone they imported $15,203,563 worth, but in 1894 there was a falling off, owing to the hard times, and the total was only $4,856,895. This does not include uncut diamonds, of which we imported more than 1,000,000 worth in 1892, $800,000 worth in 1893, and $566,267 worth in 1894.

Diamond-Cutting.

In 1880 we imported only $129,000 worth of uncut diamonds, and in 1889 only $250,000 worth. The large increase of late has been due to the fact that a number of American jewelers have opened diamond-cutting establishments. There are now fifteen establishments in the United States, which employ from one to twenty men. There are 4,000 manufacturers in Europe and about 200 in the United States, who employ between 7,000 and 8,000 persons as cutters and polishers.

Perhaps 28,000 people are employed in the diamond mines throughout the world. We read that in past centuries 60,000 people were working in some single Indian mines at one time, and perhaps that statement is not exaggerated, since by the aid of modern machinery one miner can now accomplish as much as twenty who use the primitive methods. The total value of all the diamonds in the world undoubtedly exceeds $1,000,000,000.

ASTRONOMY

How to Read the Sky

THE most exact, as well as the most sublime of all the sciences, is astronomy. Where are the souls to whom the spectacle of starry night is not an eloquent discourse? Where are those who have not been sometimes arrested in the presence of the bright worlds which hover over our heads and who have not sought for the key of the great enigma of creation?

The solitary hours of night are in truth the most beautiful of all our hours, those in which we have the faculty of placing ourselves in intimate communication with Nature. The orb of day conceals from us the splendors of the firmament; it is during the night that the panoramas of the sky are open to us. At the hour of midnight, the heavenly vault is strewn with stars, like isles of light in the midst of an ocean extending over our heads.

In the vaporous darkness our eyes gaze freely on the sky, piercing the deep azure of the apparent vault, above which the stars shine. They traverse the white constellated regions, visiting distant realms of space, where the most brilliant stars lose their brightness by distance; they go beyond this unexplored expanse, and mount still higher, as far as those faint nebulæ whose diffused brightness seems to mark the limits of the visible. In this immense passage of sight thought is carried away by its flight and wonders at these distant splendors.

It is then that thousands of questions spring up in our minds, and that a thousand points of interrogation rise to our sight. The problem of creation is a great problem! The science of the stars is a sublime science; its mission is to embrace all created things! At the remembrance of these impressions, does it not appear that the man who does not feel any sentiment of admiration before the picture of the starry splendor, is not yet worthy of receiving on his brow the crown of intelligence?

No one can study the human frame, its marvelous bones, joints, muscles, arteries, nerves; its breathing lungs and beating heart, sending its thrill of life through every fibre of the complicated system, without being led to the thought of an all-wise Creator. Far more true is it, if possible, that "an undevout astronomer is mad."

Of all the sciences astronomy is the one which can enlighten us best on our relative value, and make us understand the relation which connects the earth with the rest of creation. Without it, as the history of past centuries testifies, it is impossible for us to know where we are or who we are, or to establish an instructive comparison between the place which we occupy in space and the whole of the universe; without it we should be both ignorant of the actual extent of our country, its nature, and the order to which it belongs. Enclosed in the dark meshes of ignorance, we cannot form the slightest idea of the general arrangement of the world; a thick fog covers the narrow horizon which contains us, and our mind remains incapable of soaring above the daily theatre of life, and of going beyond the narrow sphere traced by the limits of the action of our senses.

A Universe of Wonders.

On the other hand, when the torch of the Science of the Worlds enlightens us, the scene changes, the vapors which darkened the horizon fade away, our mistaken eyes contemplate in the serenity of a pure sky the immense work of the Creator. The earth appears like a globe poised under our steps; thousands of similar globes are rocked in ether; the world enlarges in proportion as the power of our examination increases, and from that time universal creation develops itself before us in reality, establishing both our rank and our relation with the numerous similar worlds which constitute the universe.

The sun, which so many have worshiped, and which is, humanly speaking, the source of life to us all, is a perpetual wonder. Its circumference is about two million seven hundred and seventy thousand miles. Its distance from the earth is so great that a railway train moving at thirty-two miles per hour would take three millions of hours, c three hundred and forty-two years and thre months, to travel from us to the sun, supposing that it could travel incessantly nigh and day during that time. When arrived, i would be rather more than a year and a ha in reaching the sun's centre; three years an a quarter in passing through the sun, supposing it was tunnelled through, and te years and one-eighth in going round it How great these dimensions are, may b conceived from the statement, that the sam train would attain the centre of the earth i five days and a half, pass through it i eleven days, and go round it in thirty-seve days. A cannon ball, moving fifty time faster than such a train, would expend seve years in reaching the sun.

Vast Size of the Sun.

To make a globe like the sun it woul take one million four hundred thousan globes like the earth rolled into one! Or to make these facts simpler, and yet more stupendous, the bulk of the sun is five hundred times greater than the aggregate bulk of all the other bodies of the solar system o which night only reveals to us a small part —that which appears above our hemisphere and above our particular standpoint. The centre of the sun is a dark mass covered with a garment of flame. But in this luminous matter there are vast rents. We talk of spots on the sun; spots indeed! the space occupied or laid bare by the principal spot is nine hundred and twenty-eight million square geographical miles.

Arago, by a physical test, proved that this garment of flame, this luminous matter, must be gaseous; so that the sun floats in an ocean of flame, and this is so powerful that the strongest blast furnace yet ignited by man, at its highest power, is seven times veaker than the sun's heat at its surface. f the heat be electric, how great is the vonder! being dispersed over space so great hat the earth's surface, at a distance of inety-one million miles, notwithstanding the lternation of night, receives in a year suffiient, if uniformly diffused, to liquefy a crust f ice one hundred feet in thickness.

When we come to examine the sun by the id of a telescope, we find that all parts of he surface do not give out light o the same extent, and that there re certain places on it darker, nd some brighter, than the reainder of the disk. The former re sunspots, the latter faculæ.

THE SUN AND ITS REMARKABLE SPOTS.

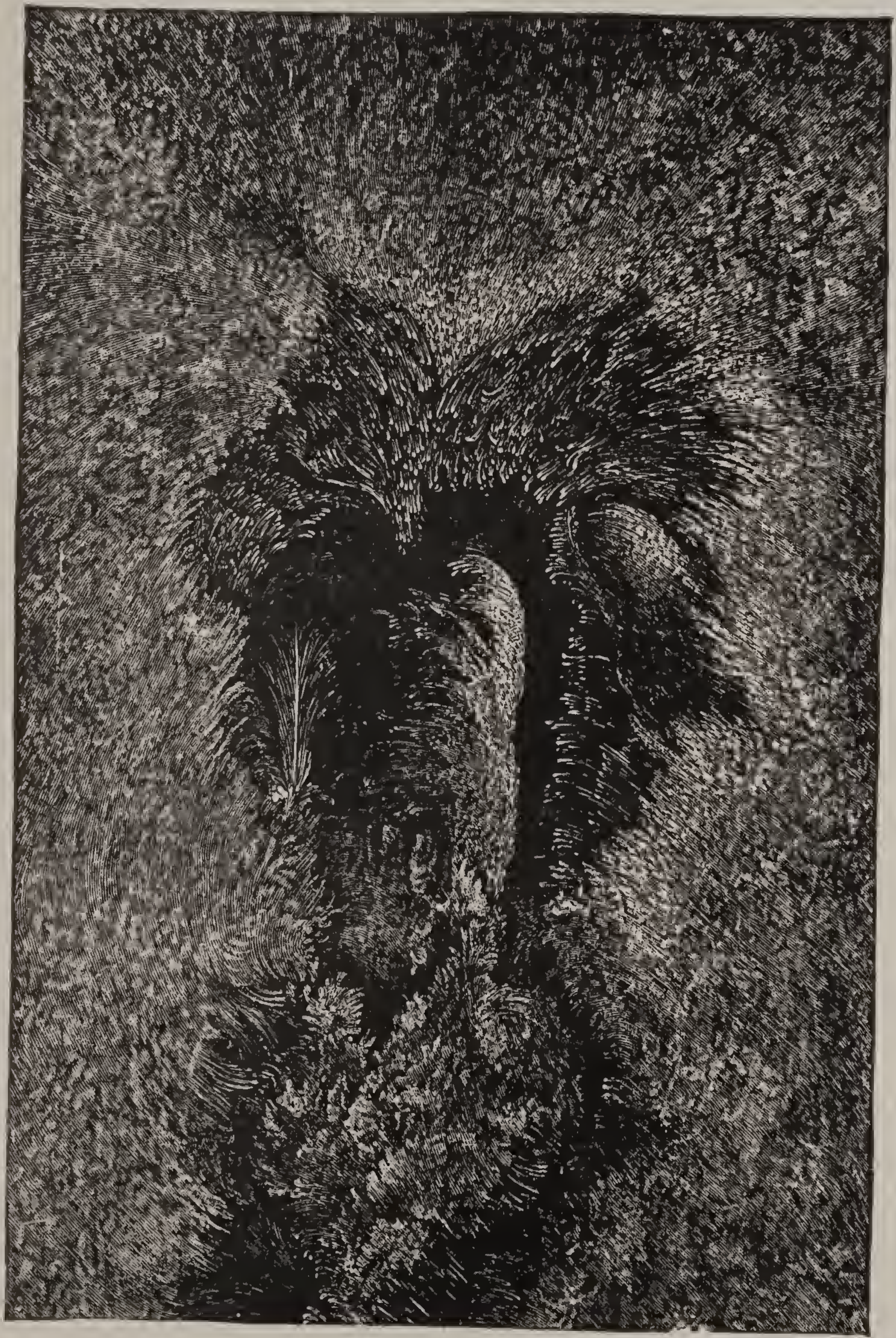
The Sun Revolves.

The first person who examned sunspots closely was the lustrious Galileo, who proeeded to determine from them he sun's velocity of rotation n his axis; for he perceived hat they moved across the sun's ody. However, since his time, has been shown that the spots ave a motion of their own; hose at the sun's equator movng faster than those at his oles; so that observations on he spots alone cannot tell us he rapidity of the revolution of the sun's ntire mass.

It has also been noticed that the number f these spots visible at one time does not emain the same from year to year, and, in act, that about every ten years there is an poch at which they are especially abundant. eneral Sabine has pointed out that these eriods of frequency of sunspots are coincient with the periods of greatest magnetic isturbance on our own globe. Accordingly, we see that there exists a distinct and close connection between variations in the appearance of the sun, and changes in the physical constitution of our earth.

The interesting question now arises: what are the sunspots? and what is their cause? The very careful investigations of science have thrown much light upon this interesting subject. One of the most remarkable features of the spots is, that their central portion is darker than the edge; and accordingly, nearly a century ago, it was suggested that they were pits in an envelope which surrounded the sun. The results of later experiments seem to confirm this idea. They further go to show that the faculæ, or bright patches, are really of the nature of luminous clouds, placed, relatively to the sun, above the level of the spots.

These faculæ are generally seen behind the spot, a position which they would necessarily assume if they were thrown up to a greater distance from his centre, and would move more slowly. The same observations have shown that spots are produced below the level of the sun's photosphere, while the faculæ are suspended in that medium. If this be admitted, it seems to follow that the two phenomena are effects of a vertical circulation in the gaseous matter surrounding the sun, the faculæ being produced when a portion somewhat denser than the medium in which it is suspended is raised into or above the photosphere, while spots are served when such a mass is below the pl tospheric stratum. In fact, one of our d gent sun observers has seen a facul apparently in the act of sinking, lose brightness and gradually pass into a spot, form remaining unchanged du ing the process.



A TYPICAL SUN-SPOT.

There is a shorter period twenty months' duration obse able in the recurrence of spo and this coincides with the p iods of recurrence of the sar relative position of Venus regards the sun and the eart The same is true of Jupiter.

Brotherhood of Worlds.

These discoveries are of t greatest interest, as they sho us how intimately all the bodi of our solar system are related each other, and how the slighte change in any one of them e erts a definite influence on t condition of the entire syster despite their great magnitude ar distance from each other.

Let us see then in what t spots of the sun consist. Ger erally, this is the aspect whic they present to us in the fie of the telescope, as seen in th accompanying engraving.

Two very distinct portions ar noticed; at the centre a wel defined black region. Aroun it a region not so black or grayish com pared with the surface of the sun whic surrounds it. The central part has receive the name of "umbra;" sometimes at th centre of this part is noticed a more intens dark spot, which is called "the nucleus.

e exterior region of the spot has received name of "penumbra." When it is stated t the centre of the spot is black, this ression must be understood as relative to general surface of the sun; for this tre, however dark it may appear by con-st, has been found of a light equal to two usand times that of the full moon.

Enormous Gulfs.

We may be led to the belief that these ts, generally invisible to the naked eye, insignificant movements carried on on the 's surface, and of small extent. It is not They are daily and very important enomena. Some of them have been own to measure 80,000 miles, that is to , they are ten times larger than the earth. r globe falling into most of them would lost as in a well. Besides being of this , they are also the seat of various actions prodigious phenomena.

They are not formed suddenly as a whole, increase to the limit they attain, and erwards diminish. Some only last a few cks, others months. Now, the movements h which they are animated, either for their rease or diminution, or in their internal ion, are sometimes of unheard-of rapidity. tely, astronomers have followed a daz-ng meteor passing through a group of ts with a velocity of eight thousand miles minute. In other parts, they have tched circular whirlwinds, dragging into ir commotion large spots like the earth, swallowing them up in abysses with fear- velocity.

Sometimes are seen the crests of stormy ves extending over parts of the penumbra, rising on the white surface of the sun as till whiter and brighter substance, doubt- s projected in their ebullition by interior ces. There have, besides, been seen immense bridges of fiery substances cast suddenly over a black spot, crossing it from one end to the other, like an arch of luminous striæ, which sometimes is dissipated, and falls down into the abysses of lower whirlpools.

This body, which each day pours out over our heads such a pure and calm light, is the seat of powerful actions, and prodigious movements, of which our tempests, hurricanes and waterspouts give us but a slight idea; for these gigantic disturbances are not performed, as here, in an atmosphere of a few miles thickness and over a few miles area, but in proportions as vast as its volume. One of the first results of the observation of solar spots was to discover that the sun turns on its axis in about twenty-five of our days.

Rapid Movement of Sun-spots.

Indeed, if we watch for several consecutive days any of the spots visible on the solar surface, or a group of spots, or even the whole sun, we shall not be long in remarking that the spots are all animated with the same movement from one edge to the other of the solar disk. If, for instance, we begin to follow a spot from its appearance at the eastern edge, we observe that it advances slowly towards the middle of the body, which it reaches about seven days after its appearance; then it passes it, and continues its course towards the west, and seven days afterward it reaches the edge and disappears.

After a period of fourteen days, employed in traveling over the opposite hemisphere, it reappears at the same place, and follows the path previously pointed out. These observations evidently show that the sun turns on an axis. This rotation of the sun shows its spots in the following manner: If the period of the reappearance of the spots is from twenty-five to twenty-eight days, this does not refute the number of twenty-five days before mentioned.

The difference proceeds from the earth not remaining immovable in space, but turning round the sun. Now, in its translatory movement round the sun, the earth advancing in the direction of its rotation, sees the spots two days and a half after they have disappeared at the point where the earth was at the commencement of the observation.

The Sun's Eternal Day.

This rotary movement takes place from west to east, like that of the earth and all planets of the system. Thus, by telescopic examination, this body declared fixed and incorruptible in antiquity, is stripped of its two distinctive qualities. The diurnal rotation of the sun is twenty-five times longer than that of the earth; but it differs essentially in its immediate consequences, because it does not produce on the surface the alternate day and night, which we derive from this movement. It cannot, then, be stated that this is the length of the solar day, for it is not the sign of a succession of light and darkness: the sun's day does not go out, and the twilight of evening does not pale it. This world lives in a permanent light.

It neither knows our seasons nor years, and the elements of our calendar cannot be applied to its astronomical *rôle*. It seems that the rapid succession of things which constitute our time, and the changing series of phenomena which we experience, do not fall to his lot; continuance and endless duration are his characteristics; and he is free from counting for his individual personal life the successive ages which, on our globe, measure life and overwhelm it with their number.

The size of the sun exceeds the degree of our habitual measurements too much for to hope to give a sufficient idea of it. the matter of volumes, as in that of distan and times, the numbers too far surpass ordinary conceptions to appeal to our min and every care that we take to repres them to ourselves remains almost ster Nevertheless, a comparison will be able inspire at least a nearer idea of the size which we refer.

If we placed the terrestrial globe in t centre of the solar globe, like a kernel in t middle of a fruit, the distance of the mo would be included in the interior of the so body; the moon itself would be absorbed it, and beyond the moon to the surface the sun, following the same radius, should still have to traverse a distance 200,000 miles. From the earth to the s are reckoned 91,000,000 miles. It is account of this great distance that t immense body only appears to measure foot in diameter; and this explains why t ancients, and Epicurus in particular, did r believe it larger than that measure.

How to Ascertain the Distance.

This distance equally explains why it d not appear to us larger than the moon, whi is only 240,000 miles away. From this may reasonably be asked, how this distan from the sun to the earth could possibly determined. The method is too complicat for us to explain it here in detail; but idea may be given of it without exceedi the limits of this chapter.

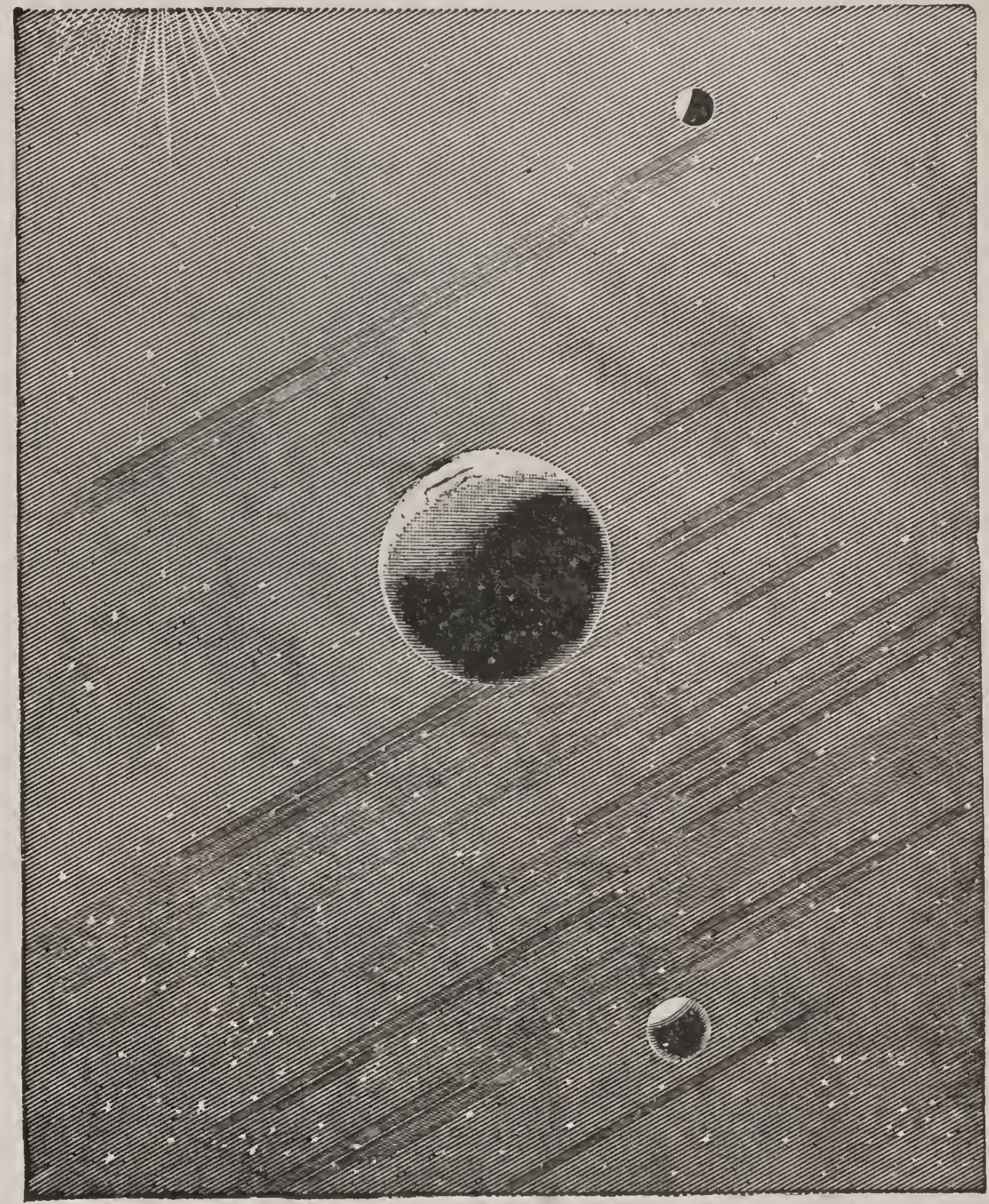
Between the sun and the earth there a two planets, Mercury and Venus: the latt has rendered the greatest service in the stu of the distance, which separates us from t sun. As its orbit (the circumference whi it describes round the central body) is near on the same plane as the earth's orbit, pens from time to time that it passes ween the sun and ourselves, and appears a black spot crossing the luminous disk. is passage takes place at the singular rvals of eight years, 113½ years—8 rs, 113½ years + 8 years.

At these valuable periods, astronomers of countries forget their nationality, and lis- ing to each other like brothers, place mselves so as to observe the pas- e of Venus in different countries. o observers situated in the sta- ns most distant from each other, e the two points where the planet, n from each of their stations, ms to be projected at the same ment on the solar disk. This asure gives them the angle formed two lines starting from their sta- ns, and crossing each other on nus, and passing on to the sun. e measure of this angle, gives what named the parallax of the sun.

Waiting Eight Years.

At the transit of Venus, in 1761, a ench astronomer, Le Gentil—his me should have preserved him m such disappointments on the rt of Venus—was curiously re- ited for his love of science and disinterestedness. Sent to India the Académie des Sciences, he barked with arms and baggage to observe passage of the planet at Pondicherry. s great activity and ardor could not con- er the chances of the sea voyage; he ded a few days after the phenomenon had en place. The obstacles irritated him and reased his courage. He formed the roic resolution of remaining for eight ars in the midst of that unknown country, order to compensate himself for his lost observation; he waited for the passage of 1769, and then made all desired arrangements to obtain a perfect observation.

The year and the day at length arrived! The sky was clear and no obstacle hindered his long resolution from at last receiving its reward. But, alas! exactly at the moment when the black spot was about to enter on the solar disk, a small cloud formed in the atmosphere and remained before the sun until the moment when Venus left the disk, putting an end to the possibility of all observation. The astronomer again took the voyage to France with a stormy sea, which brought his days to a close.


THE EARTH FLOATING IN SPACE.

The last transit of Venus was in 1882, and there will not be another until June, 2004.

From considerations based on the magnetic action of the sun, we may be led to believe that its light is of the same nature as the electric light, only incomparably more powerful, seeing that the elements which we have at command are infinitely inferior to those commanded by nature. However bright our electric foci may be, however dazzling their light, the whiteness of which astonishes us, when it is projected on the solar disk, the electric light has the appearance of a black spot.

Inconceivable Heat.

The intensity of solar heat is not less difficult to conceive; the most intense of our furnaces, which rise to the temperature of white heat, does not give us a faint idea of it. However, the following comparisons will indicate its value. If we represent the sun under the form of an enormous globe built up of a million four hundred thousand terrestrial globes, and covered entirely with a stratum of coal fourteen miles thick, the heat which it pours out annually in space is equal to that which would be furnished by this stratum of flaming coal. This solar heat would also be capable of melting in one second a column of ice which would measure 1590 square miles at its base, and 192,000 miles high.

It is curious to inquire how much this gigantic body weighs. When astronomers place the sun in one of the pans of the immense scales with which they determine the weight of the stars, it is necessary for them to put in the other one, 350,000 terrestrial globes like our own to restore equilibrium.

Many of the chemical effects of the sun's light are, and long have been, familiar. Linen and cotton cloth exposed to it, for a length of time, as is well known, will be bleached; and fabrics dyed of certain colors will be faded, or changed into a different shade. Yellow wax laid beneath the solar rays will be turned white; and the colorless h silver in a few minutes changed into a vic tint. And so of many other substances.

If a piece of paper, or a finger, be dipp in lunar caustic, and then be exposed to t sun, it will quickly turn black. If initial l ters or names be written on linen with w is called indelible ink, they will be at fi quite pale, but by a short exposure to t sunlight they turn dark. If a sheet of pap be plunged into a solution of common sa then dried, and again be dipped into a sol tion of silver, it becomes so sensitive to t action of the sunrays, that if ferns and leav such as those represented in Fig. 1, be plac upon it, and then exposed to the summe sun, the uncovered part of the paper w turn black, while that beneath the ferns a leaves will remain white, presenting an exa impress of the whole group, as in Fig. 2.

Pictures Made by the Sun.

Nothing can give a more beautiful pictu of them; the light works through the slend leaves, but not through the thicker and mo compact stems, and thus copies all, even the minutest veins. This process has bee turned to important practical purposes; has been of great service, for example, military operations, where it was necessar to make quickly a copy of some map which there was only one impression. If duplicate had to be made by hand, it wou require several days to accomplish it; n would it then have been as correct as th printed by the sun in the above manner.

It is by the chemical action of the sun, a is well known, that the photographer bring forth his marvelous productions—productions which are not only of pleasing personal interest, but of the greatest practica value in art, science, and literature. By th simple action of the sunrays upon certai substances overspreading the surface of metalic or paper tablets, he can obtain an accurate ikeness of any person, place, or thing he may desire. In this way he is enabled to preserve for us the lineaments of those who have benefited their race by their learning, heir skill or their bravery.

By the agency of the very rays which llumine the countenance and reveal the briliancy of the laughing eye and the charm of he roseate cheek, he can at once secure for us a lifelike picture of the form and features ve most admire and love. In the same manner he can copy the outlines and details of natural scenery with perfect fidelity. In his picture will be found every undulation of the landscape, every projecting rock, every sinuous stream, each spreading tree, each grazing ox, the peasant's home, the vilage spire, together with every other object and feature in the scene—these, all these, he an faithfully transfer to his plate, in all their varied and delicate shades, by the agency of he sunbeams which illuminate the whole.

The chemistry of the solar rays, in our day, has become a most important auxiliary to nearly every branch of human study or investigation. By its means the traveler is enabled to bring home accurate representations of the scenery, inhabitants, and productions he has witnessed in foreign climes; the geologist, to secure unerring delineations of the marvellous fossils of the flora and fauna he has discovered in the deep strata of the earth; the astronomer, to present the transient appearances of the eclipses he has observed in the heavens; the meteorologist, to furnish a correct registry of his barometer and thermometer every hour.

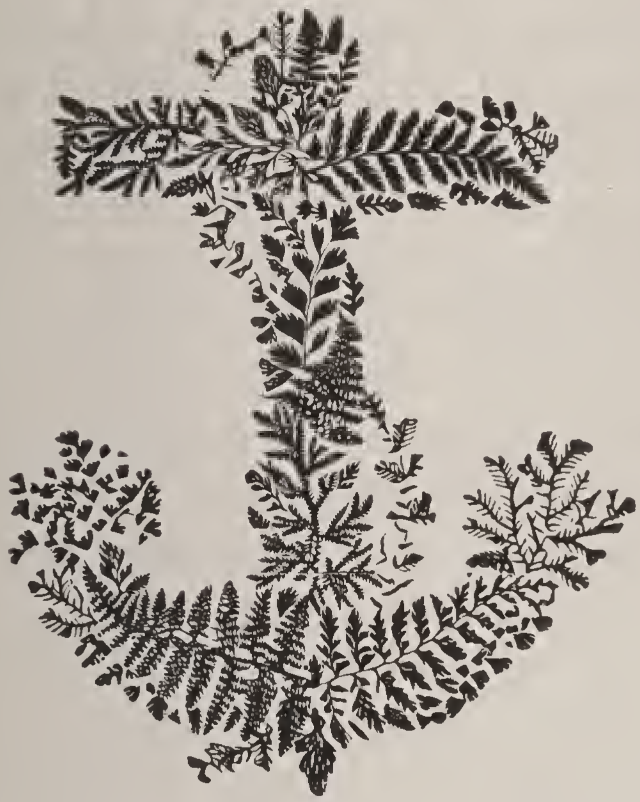


Fig. 1.

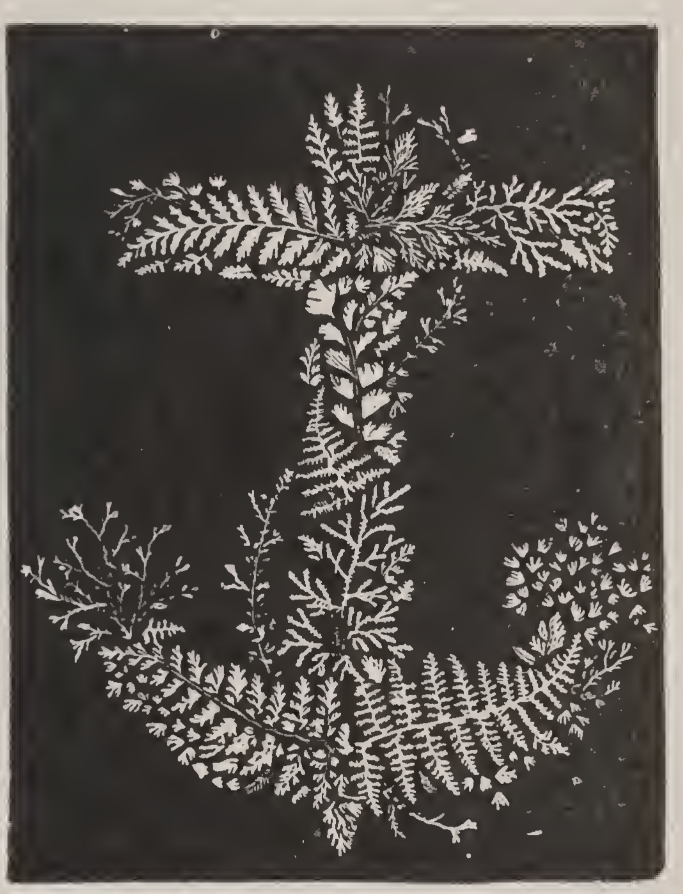


Fig. 2.

WREATHS COPIED BY THE SUN.

By its aid the antiquarian is able to obtain a fac-simile of the ruined temples, broken statuary, and obscured inscriptions which he has found on the fields of ancient civilization and power; the botanist, to copy with nature's exactness the forms and parts of plants, the stamens, and corolla, and pistils, and pollen of flowers; and the anatomist, to exhibit the various organs and functions of the body, both in their normal and abnormal conditions.

As nothing is more general in its application, so nothing is more perfect and admirable in its execution, than the sunbeam. No object is too great, and none too minute for it to depict. It can give us large pictures, with every detail perfect and in its right proportion, of the minutest objects, such as insects and animalcula; and it can furnish us with microscopic pictures, equally correct, of objects huge or vast. This is achieved by the intervention of lenses that magnify or diminish the image.

Microscopic photography is of great importance in relation to anatomic preparations, which quickly change and become decomposed; it is also of very essential help in the study of fixed and permanent bodies. Jewelry, and even toys are sometimes made, containing minute photographs beneath small magnifying glasses. When these are held before the eye, small transparent images, some of them portraits, some statues, and others, writings, come into view in admirable perfection. Such things, however, serve rather for amusement than use.

Microscopic Photography.

But there are cases where microscopic photography may prove of no little value and importance. It has been suggested that in this way the contents of ponderous volumes might be concentrated within a few square inches, and the books of a whole library be reduced within the capacity of a single drawer. Though nothing of this sort, as far as the author is aware, has thus far been done, yet the process has been employed for other ends under most interesting circumstances.

Professor Hermann Vogel relates that during the seige of Paris, in 1870, the blockaded city held communication with the world outside by means of balloons and carrier pigeons. The first mode of communication was almost engrossed for political objects; the second only admitted the transmission of very minute writing. Letters however condensed, could scarcely hav been sent more than two or three at a tim by a pigeon. In this case, microscopi photography presented a valuable means o concentrating many pages on a collodio film of only one square inch, and of expediting more than a dozen of such almost imponderable films packed in one quill.

What the Sunbeam Can Do.

Dagrand, at Paris, who first prepared microscopic photographs, also set going the system of these pigeon dispatches. All the correspondence which had to be diminished was first set up in type, and printed together on a folio page. A microscopic photograph was made of this folio page, contained in about the space of 1½ square inches. This collodion film, with the image upon it, was then glazed over by pouring leather collodion over it; that is, collodion containing a solution of glycerine. This glucose collodion easily dries, separates from the picture, and forms a transparent film; a membrane of this kind could contain as many as fifteen hundred despatches.

At the place of arrival these membranes were unrolled, and then enlarged by the help of a magic lantern; a number of writers thereupon set to work to copy the enlarged despatches, and ultimately forwarded them to their respective addresses. Thus Paris corresponded, by the aid of photography, for six months with the world without, and even poor persons were able to let their relatives know that they still lived.

Another marvelous fact pertaining to the chemistry of the solar ray is, the rapidity with which it produces its effects upon certain substances. A new negative process has lately been discovered; it consists in the se of a gelatine emulsion of silver bro-iide for the sensitive surface. With a plate ius prepared, a photograph may now be ken in one second of time which it for-ierly took thirty seconds to secure; and a ate can be prepared which needs an ex-osure of only one-sixtieth of a second, hen a view is fairly lighted, to secure a soft nd harmonious negative.

Thus it appears that the solar rays are capa-le of instantaneous chemical action, and f producing for us a perfect picture of a ian in full activity, or of an object in rapid iotion. The likeness of an orator may be iken at the moment of his highest pitch of oquence, giving not only his attitude and esticulation, but the very expression of his atures. A squadron of cavalry can be ctured as they advance with rushing speed the deadly charge, each man, each orse appearing a distinct figure in the cene.

Nay, a view has been taken in which ie shadow and reflections of a swallow assing in the air over a pond were per-ctly represented. How wonderful the orkings of the laws of nature! how osely related all its parts! how admira-y constituted every ray of the sun to iove every atom to accomplish the pur-oses of Him who worketh all in all.

Eclipse of the Sun.

The total eclipse occurs when the moon is ear to the earth, and when her distance om us is such that her apparent diameter sufficient to cover the entire disk of the in. This is an event of great interest to e astronomer, both on account of its short iration and rare occurrence.

The longest time an eclipse of the sun n be total is seven minutes; but often does not exceed three or four minutes. And it takes place at any one locality only at distant intervals; for instance, at London, prior to the total eclipse of 1715, no such phenomenon had been visible for a period of 575 years.

Among all the evolutions of the creation, visible to us, no occurrence is more striking or impressive than this. "A total eclipse of the sun," says Lockyer, "is at once one of the grandest and most awe-inspiring sights it is possible for man to witness. As the eclipse advances, but before the disk is wholly obscured, the sky grows of a dusky livid, or purple, or yellow crimson color, which gradually gets darker and darker, and the color appears to run over large portions of the sky, irrespective of the clouds. The sea turns lurid red. This singular coloring and darkening of the landscape is quite unlike the approach of night, and gives rise to strange feelings of sadness.

THE SUN ECLIPSED.

"The moon's shadow sweeps across the surface of the earth, and is even seen in the air; the rapidity of its motion and its intenseness produce a feeling that something material is rushing over the earth at a speed perfectly frightful. All sense of distance is lost; the faces of men assume a livid hue, flowers close, fowls hasten to roost, cocks crow, birds flutter to the ground in fright, dogs whine, sheep collect together as if apprehending danger, horses and oxen lie down, obstinately resisting the whip and t goad; in a word, the whole animal wor seems frightened out of its usual propriet and all things wear the garb of terror."

The Brilliant Corona

CELESTIAL phenomena, also, attend a total eclipse, still more grand and imposing. A few seconds before the commencement of the total obscuration, the stars burst out, and surrounding the dark moon on all sides is seen a glorious halo, commonly of a silvery white light, which is called the corona. This radiates and extends beyond the moon, to a distance equal to her apparent diameter, and in some eclipses is observed to reach to a much greater distance.

This luminous appendage is supposed to be the sun's atmosphere, which is not seen when the sun itself is visible, owing to its overpowering splendor. General Myer gives the following description of the corona, as observed by him from the summit of White Top Mountain, Virginia, 5530 feet above the level of the sea, this elevated station being chosen in order to escape the smoke and haze which generally prevail in lower regions:

"The eclipse presented, during the total obscurations, a vision magnificent beyond description. As a centre stood the full and intensely black disk of the moon, surrounded by the aureola of a soft, bright light, throug which shot out, as if from the circumferenc of the moon, straight, massive, silvery rays seeming distinct and separate from eac other, to a distance of two or three diameter of the lunar disk, the whole spectacle showing as upon a background of diffused rose colored light.

A Gorgeous Spectacle.

"This light was most intense, and extended farthest, at about the centre of th lower limb, the position of the souther prominence. The silvery rays were longes and most prominent at four points of th circumference, two upon the upper and tw upon the lower portion, apparently equidistant from each other, giving the spectacl a quadrilateral shape."

Great changes in the solar prominences, a a rule, take place only very slowly, or quit imperceptibly. In some cases, however, th change in the form of a prominence is s extraordinary, and occurs with such rapidity that it can only be ascribed to extremely violent agitations in the upper portions of th solar atmosphere, compared with which th cyclonic storms occasionally agitating th th's atmosphere, sink into insignificance. Professor Respighi is of the opinion that solar prominences are of an eruptive gin and of a gaseous nature, and that ctric action in some form is concerned in ducing these eruptions. He observed ne prominences that exceeded three nutes, or ten times the earth's diameter, height; and one prominence that was not s than twenty times the earth's diameter, 160,000 miles in altitude. He also iced that the formation of a prominence usually preceded by the appearance of a tilinear jet, either vertical or oblique, and y bright and well defined.

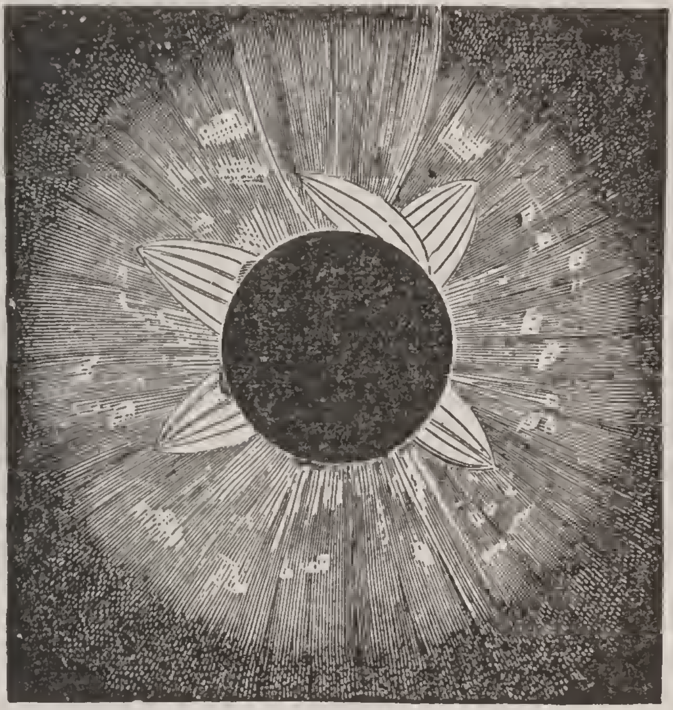
Wonderful Eruptions.

This jet rising to a great height, is seen bend back again, falling toward the sun the jets of our fountains, and presently sinking matter is observed to assume the pe of gigantic trees, more or less rich in nches and foliage. Gradually the whole ks down upon the sun, sometimes forming ated clouds before reaching the solar face. It is in the upper portions of such minences that the most remarkable and d transformations are witnessed; but a at difference is observed in the rate with ch prominences change in figure.

heir duration, too, is very variable. Some elop and disappear in a few minutes, le others remain visible for several days. considers that the sharply defined bases he eruptive jets prove that the eruption s place through some compact substance, ning a species of solar crust. He also s that the enormous velocity with which e gaseous masses rush through the solar osphere implies that the latter is of ex- ing tenuity.

rofessor Young, of Dartmouth College, neans of an instrument called "telespectroscope," witnessed the most remarkable outburst from the sun ever yet seen by man. "On the 7th of September, 1871, between 12.30 and 2 P. M.," he says, "there occurred an outburst of solar energy remarkable for its sudden violence. Just at noon I had been examining with the telespectroscope an enormous protuberance of hydrogen close on the eastern limb of the sun. It had remained with very little change since the preceding noon—a long, low, quiet-looking cloud, not very dense or brilliant, nor in any way remarkable except for its size.

"It was made up mostly of filaments nearly horizontal, and floated above the chromatosphere with its lower surface at a height of some 15,000 miles, but was connected with it, as is usually the case, by three or four vertical columns brighter and more active than the rest. Lockyer compares such masses to a banyan grove. It was about 100,000 miles long by 54,000 high.

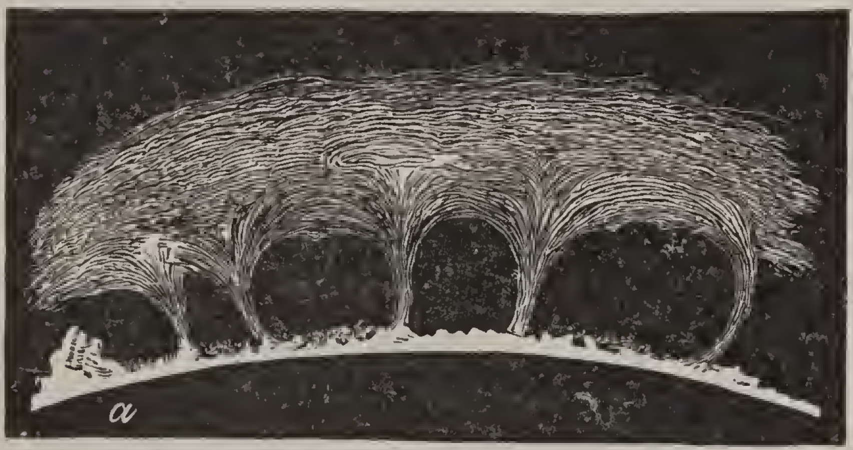


REMARKABLE CORONA.

"At 12.30, when I was called away for a few minutes, there was no indication of what was about to happen, except that one of the connecting stems at the southern extremity of the cloud had grown considerably brighter, and was curiously bent to one side; and near the base of another at the northern end a little brilliant lump had developed itself, shaped much like a summer thunder-head. The annexed figure represents the prominence at this time, *a* being the thunder-head.

"What was my surprise, then, on returning in less than half an hour, to find that in the meantime the whole thing had been literally blown to shreds by some inconceivable uprush from beneath. In place of the quiet cloud I had left, the air, if I may use the expression, was filled with flying *débris*—a mass of detached vertical fusiform filaments, brighter and closer together where the pillars had formerly stood, and rapidly ascending.

"When I first looked, some of them had already reached a height of nearly 100,000 miles, and while I watched them they rose with a motion almost perceptible to the eye, until in ten minutes the uppermost were more than 200,000 miles above the solar surface. This was ascertained by careful measurement. The velocity of ascent also, 166 miles per second, is considerably greater than anything hitherto recorded.



BANYAN GROVE ON THE SUN.

"A general idea of its appearance when the filaments attained their greatest elevation may be obtained from the accompanying cut (Fig. 1). As the filaments rose they gradually faded away like a dissolving cloud, and at 1.15 only a few filmy wisps, with some brighter streamers low down near the chromatosphere, remained to mark the place.

"But in the meanwhile the little thund head, before alluded to, had grown a developed wonderfully into a mass of rolli and everchanging flame, to speak accordi to appearance. First it was crowded dov as it were, along the solar surface (Fig. 3, later it rose almost pyramidally 50,000 mi in height; then its summit was drawn into long filaments and threads which w most curiously rolled backwards and dov wards, like the volutes of an Ionic capi (Fig. 2); and finally it faded away, and 2.30 had vanished like the other. T accompanying cuts show it in its full dev opment; the former having been sketch at 1.40, and the latter at 1.55.

Grand Burst of Flame.

The whole phenomenon suggested m forcibly the idea of an explosion under t great prominence, acting mainly upwar but also in all directions outwards, and th after an interval, followed by a correspondi in-rush. The same afternoon a portion the chromatosphere on the western limb the sun was for several hours in a state unusual brilliancy and excitement.

Such are some of the marvelous pheno ena made known to us by astronomi science. We can say with Byron in brilliant apostrophe:

Glorious orb! the idol
Of early nature and the vigorous race
Of undiseased mankind, the giants' sons
Of the embrace of angels with a sex
More beautiful than they which did draw down
The erring spirits who can ne'er return,—
Most glorious orb! that wert a worship ere
The mystery of thy making was revealed!
Thou earliest minister of the Almighty,
Which gladdened, on their mountain-tops, the hea
Of the Chaldean shepherds till they poured
Themselves in orisons? Thou material God!
And representative of the Unknown—
Who chose thee for His shadow! Thou chief sta
Centre of many stars! which make'st our earth

Endurable, and temperest the hues
And hearts of all who walk within thy rays!
Sire of the seasons! Monarch of the climes,
And those who dwell in them! for near or far,
Our inborn spirits have a tint of thee,
Even as our outward aspects: thou dost rise,
And shine, and set in glory.

The formation of visible vapors, and their aggregation in masses, take place generally n high regions of the atmosphere under the action of currents, in conequence of a decrease of emperature and a due supply of aqueous elastic vapor being present in hose parts where clouds arise. It is easy to perceive that these two conditions, necessary to the production of cloud-land, may be fulfilled in one stratum of the atmosphere and not in another; and hence the frequent diversity in the appearance of he sky, the clear blue ields and patches of ether alternating with visible vaporous structures.

The clouds are supposed to consist of minute globules of water filled with air; but there is great difficulty, even with he aid of this view of heir structure, in explaing their suspension aloft, for the globules must be specifically heavier than the air by which they are upborne. The theory of ascending currents of heated air has been proposed by Lussac to account for their posiion; and the retention of solar heat in the clouds themselves, buoying them up and causing them to float, by Fresnel.

Fig. 1.

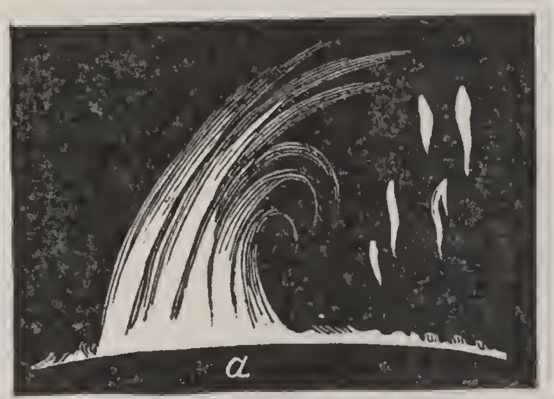


Fig. 2.

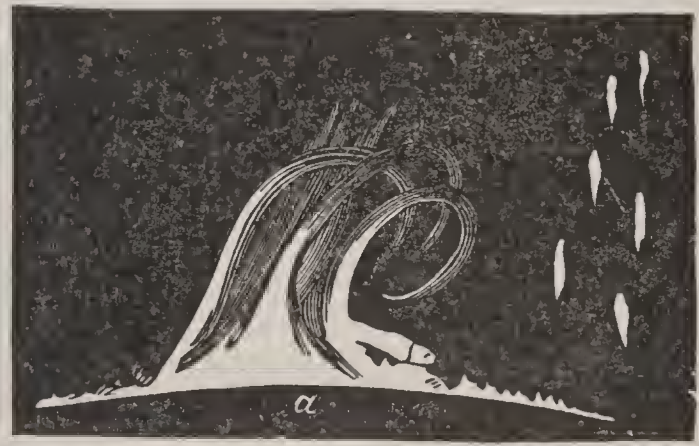
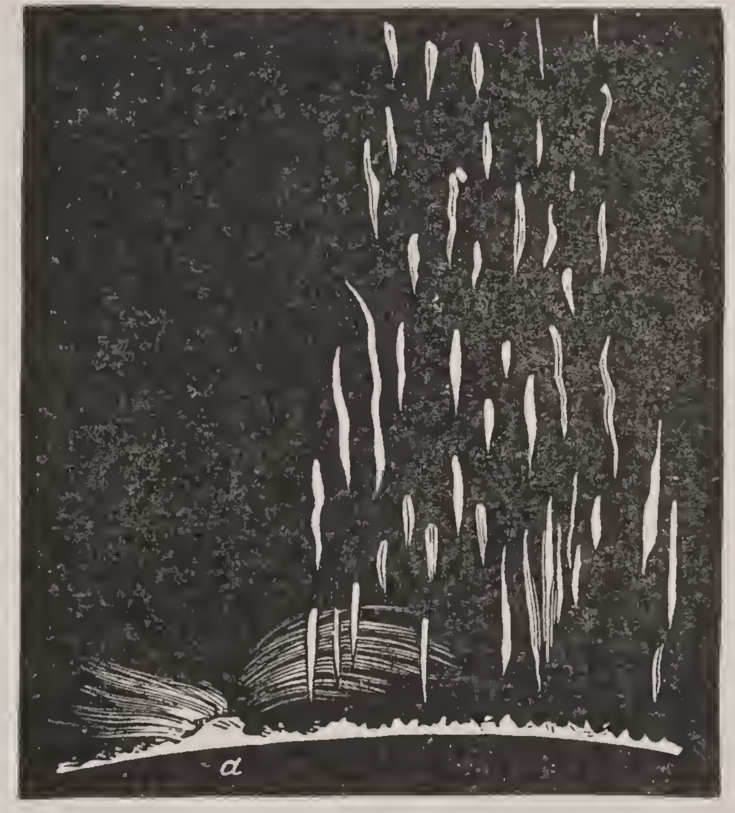
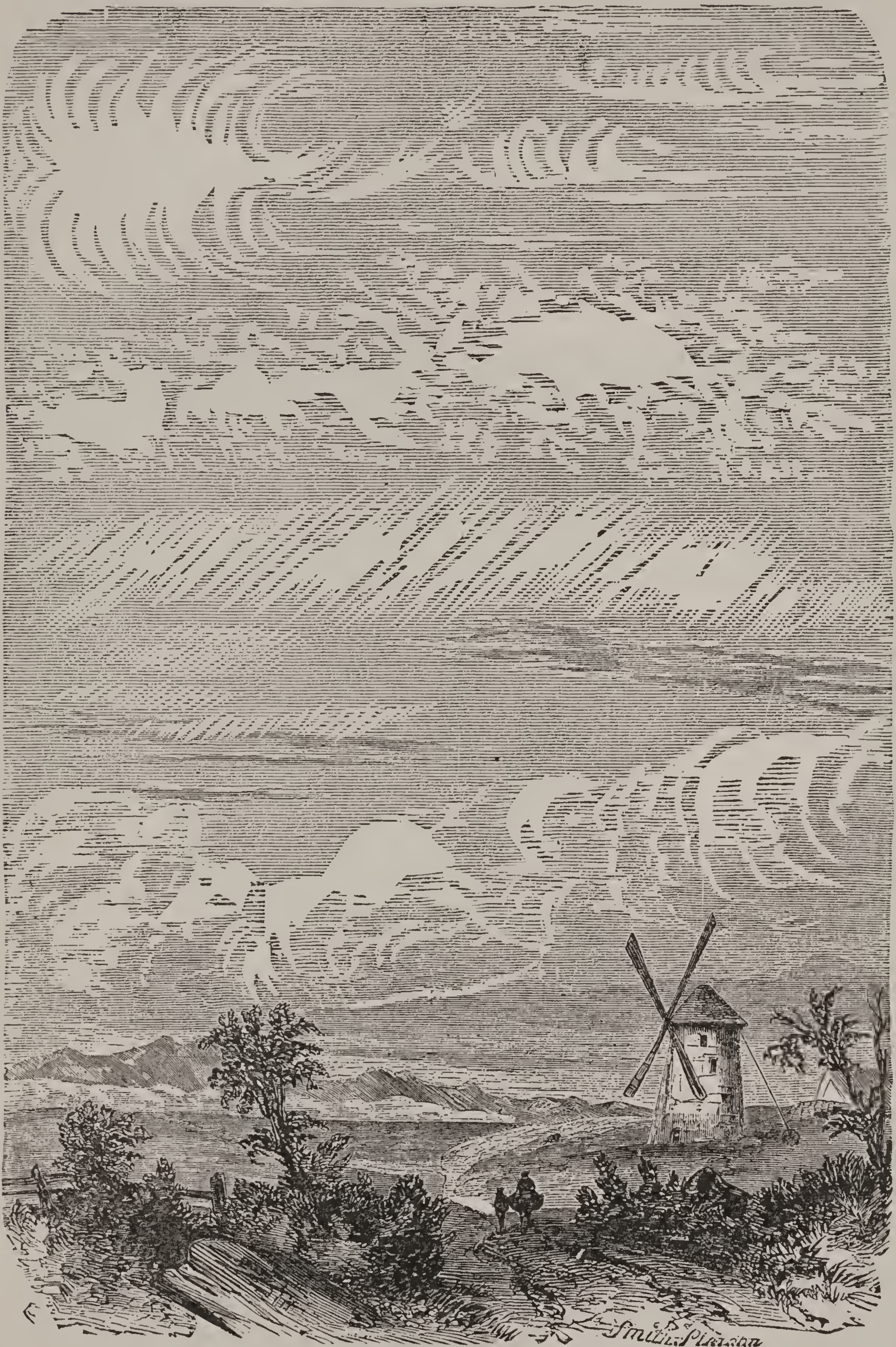


Fig. 3.



EXPLOSIVE PHENOMENA IN THE SUN.

The clouds float at different elevations, but the higher we ascend the drier the atmosphere is found, and the less loaded with vapors. We shall not err much, says Leslie, if we estimate the position of extreme humidity at the height of two miles at the pole, and four miles and a half under the equator, or a mile and a half beyond the limit of congelation. Dalton asserts that small, fleecy patches of cloud are frequently from three to five miles in height, and such have been observed sailing above the most elevated peaks of the Andes, which rise twenty-five thousand feet above the level of the sea; but other authorities claim for some visible clouds a still greater elevation. The height varies at different seasons of the year, and there is little doubt that it is much more frequently below than above a mile.



STRIKING APPEARANCES OF CLOUD-LAND.

The effect is striking when, from an eminence which commands a view of an extensive plain or valley, we see the gossamer curtain of the night resting upon the surfac
gradually rent and torn by the action of tl
sun's rays, reflec
ing their golde
hue as it disa
pears. Many
the most felicito
images of poetr
are derived fro
this source, as
Ossian: "The so
of Nathos was sa
like the sun in
day of mist, whe
his face look
watery and dim;
and again, whe
two contendin
factions are s
lenced by Cath
mor: "They sun
from the king o
either side, lik
two columns o
morning mist, whe
the sun rises be
tween them on th
glittering rocks."

The stratus i
occasionally see
under peculiar an
striking circum
stances, extendin
over the surface o
a sheet of water
without passing th
boundary of it
banks. Thus a lak
or river will exhibi
a white cloud o
visible vapor resting upon it, from which the adjacent land is perfectly free. Sir Humphry Davy thus explains this curious phenomenon:

"All persons who have been accustomed to the observation of nature must have frequently witnessed the formation of mists over the beds of rivers and lakes in calm and clear weather after sunset; and whoever has considered these phenomena in relation to the radiation and communication of heat and the nature of vapor, can hardly have failed to discover the true cause of them.

Phenomena of Heat.

"As soon as the sun has disappeared from any part of the globe, the surface begins to lose heat by radiation, and in greater proportions as the sky is clear; but the land and the water are cooled by this operation in a very different manner; the impression of cooling on the land is limited to the surface, and very slowly transmitted to the interior; whereas in water above forty degrees Fahrenheit, as soon as the upper stratum is cooled, whether by radiation or evaporation, it sinks in the mass of fluid, and its place is supplied by water from below; and till the temperature of the whole mass is reduced to nearly forty degrees Fahrenheit, the surface cannot be the coolest part.

"It follows, therefore, that wherever water exists in considerable mass, and has a temperature nearly equal to that of the land, or only a few degrees below it, and above forty degrees Fahrenheit at sunset, its surface during the night, in calm and clear weather, will be warmer than that of the contiguous land; and the air above the land will necessarily be colder than that above the water; and when they both contain their due proportion of aqueous vapor, and the situation of the ground is such as to permit the cold air from the land to mix with the warmer air above the water, mist or fog will be the result."

The atmosphere of our globe is composed mainly of two gases, oxygen and hydrogen, whose combination forms a perfectly transparent medium. In this medium, however, there floats at all times a vast quantity of aqueous vapor, raised daily by the heat of the sun, in the form of steam, from the surface of the sea and of the dry land. The amount of water thus lifted into the air by the process of evaporation is very great, and far exceeds that discharged into the ocean, during the same length of time, by all the rivers of the earth.

How the Sun is Colored.

The aqueous vapor produced in this manner is diffused through the whole body of the atmosphere, and is in a state of perpetual motion and change, being rarefied into an invisible condition, or condensed into mists and clouds, according to the varying degrees of heat or cold to which it is exposed; and in this way it affects, sometimes more and sometimes less, the general transparency of the air, and modifies both the colors and the forms of objects seen through it. And in the present chapter we are to speak of the various aspects which it gives to the solar orb.

The sun, viewed through a vaporous atmosphere, appears in "false colors." When the vapor is dry and rarefied, or in an invisible condition, the air is clear, and the sun is seen in its natural brightness. But if the vapor be slightly condensed, and takes the form of mist, he appears through it as if shorn of his glories, a white orb, upon which the eye can rest without pain or inconvenience; as he descends he grows still more dull; and finally, as he approaches the horizon, he gradually assumes a rosy tint, and at last a deep red color.

These changes are thus explained. Every ray of the sunlight which comes to us has to pass through the whole thickness of the atmosphere, and the greater the distance it has to travel the greater the portion of it that is absorbed by the vapors in the air. And this distance, as is obvious, increases with the increased declination of the sun.

If we admit the atmosphere to extend vertically to the height of sixty-two miles, a ray of light coming from the sun at the zenith has only these sixty-two miles to pass through in order to reach us. But a ray from the sun on the horizon has to travel through seven hundred and six miles, or more than eleven times the former distance, and that, too, through the densest portion of the atmosphere. In traversing this great distance, the various colors combined in the perfectly white ray, except the red, are, for the most part, absorbed by the slowly condensing vapors along the cooling surface of the earth. Hence the red color in which the sun appears at its setting and rising.

The Sun's Apparent Form.

The sun, viewed through a vaporous atmosphere, often appears, also, in a "false form." Seen on the meridian, through a clear sky, he appears as a perfect circle, which is his true outline. But as seen near the horizon, in certain conditions of the atmosphere, instead of being circular, he appears of an oval form, the upper and lower sides being flattened, and the latter more so than the former. On high mountains, and on plateaux near the seacoast, this flattening of the disk appears very considerable, amounting sometimes to one-fifth the apparent diameter of the sun. This peculiar deformation is caused by the refraction or bending of the rays of light in passing through the vapors of the atmosphere. Sometimes the want of homogeneity in the successive layers of the atmosphere, caused by the unequal admixture of vapors, gives to the sun an appare form of so irregular a character that he scarcely recognizable.

Again, the sun, viewed through the atmo pheric vapors, in a certain state, appears su rounded by appendages which do not belon to him. When the sky is hazy, and presen a dull, milky appearance, there is frequent to be seen around the sun a colored circl or halo, and the sun occupying the centre the circle, as *h h*. The inner edge of th circle is colored red, and is well define The sky within the halo is much dark than it is for some distance without.

Magnificent Halos.

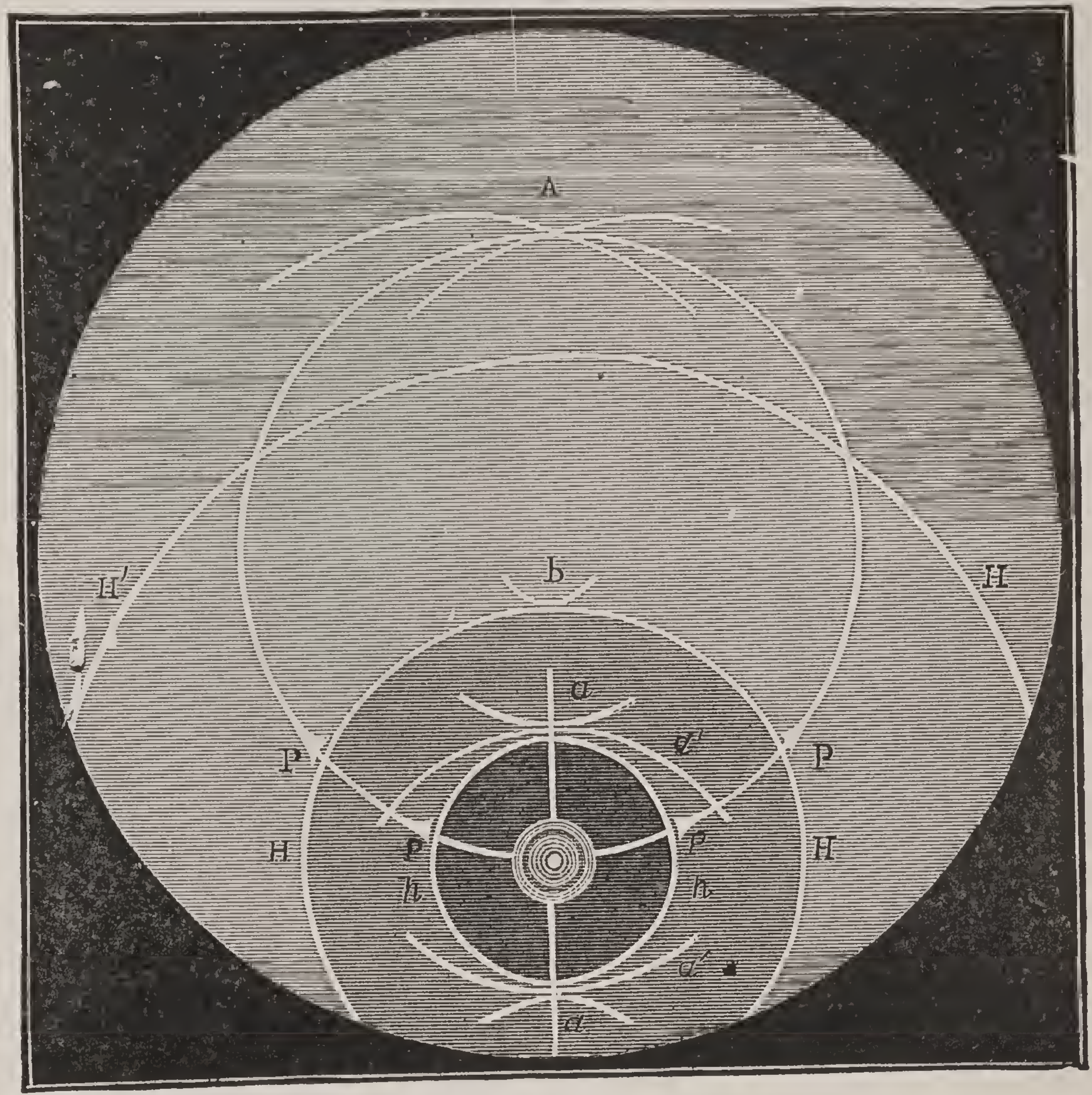
Sometimes there may be seen around th sun a second halo or colored circle, as H H The inner edge of this also is red, and tole ably well defined, while the outer edge is a pale blue color, and but faintly marke At rare intervals, a third halo, radius, as H H′, has been observed, surrounding the su Unlike the other two halos, this one show scarcely a trace of color.

All these phenomena are produced by th refraction of the sunlight in passing throug the minute crystals of frozen vapors floatin in the atmosphere; these crystals being various kinds and having their facets set different inclinations to one another, refra the various colors of the sunrays at differen angles, and thus produce halos of differe diameters.

When a halo is formed around the su there is often to be seen a white circle pass ing through the sun, and parallel to th horizon, as represented by A P P. This called parhelic circle, and is produced lik the foregoing by the reflection of the sun' light from ice prisms or snow crystals, whos surfaces have a vertical position. At or nea those points where halos cut the parheli circle, there is a double cause of light; and here the illumination is sometimes so great as to present the appearance of a mock-sun, and is called parhelion.

The number of these mock-suns, or parhelia, visible at the same time, is variable; sometimes one or two only are to be seen, at other times four or five; on some occasions as many as seven have been observed at once. The mock-suns generally seem about the size of the true sun, but not quite so bright, though occasionally they are said to rival their parent luminary in splendor. These beautiful phenomena appear most commonly in high latitudes, but often occur in the more temperate regions.

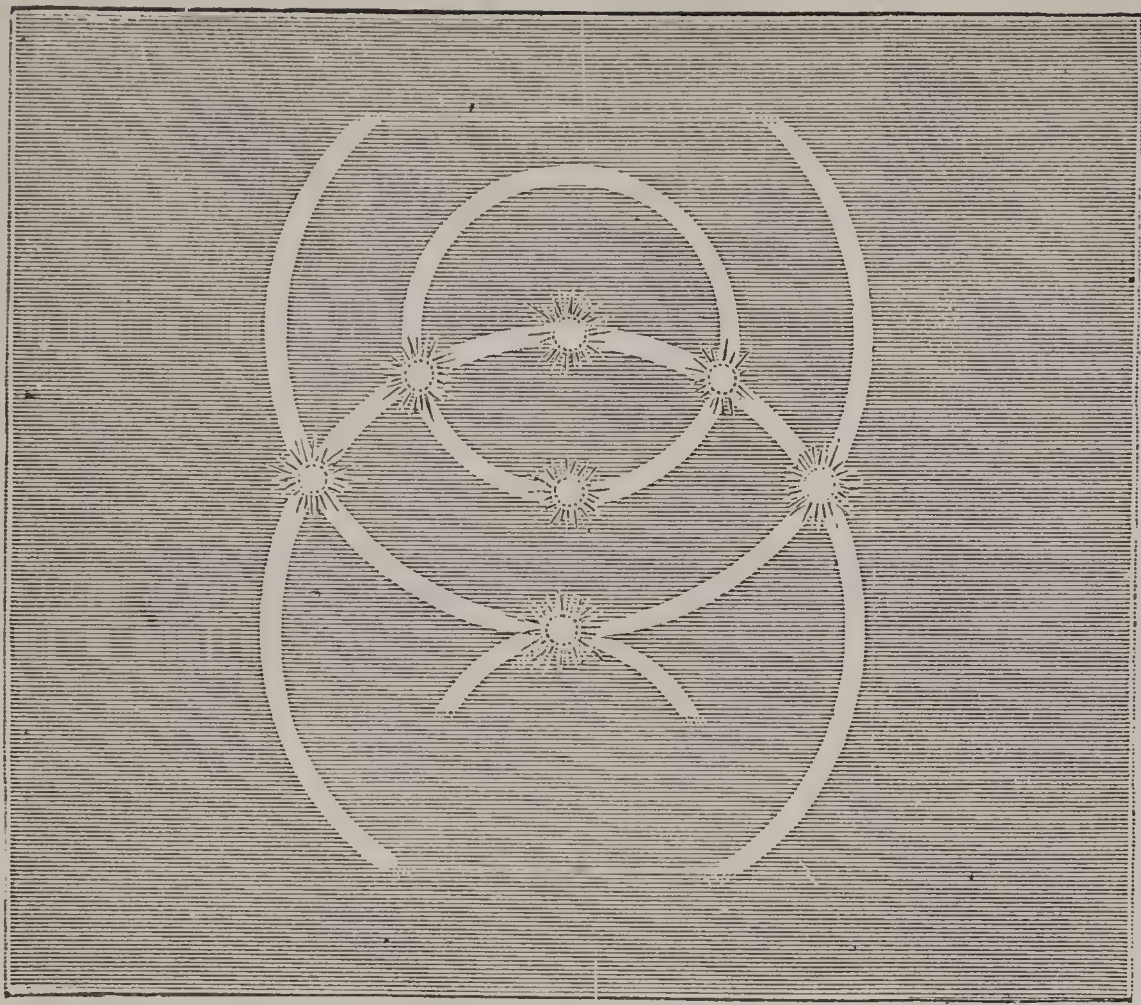
Parhelia have been observed frequently both in ancient and modern times. Aristotle records two appearances of these meteors, and Pliny mentions their occurrence at Rome. A double parhelion, which was noticed before the Christian era, is referred to by St. Augustine. Many others have been observed from different points on the continent. On the 2d of January, 1586, Christopher Rotham saw, at Cassel, before sunrise, an upright column of light of the breadth of the sun's disk. As the sun rose, he was preceded and followed by a parhelion, which appeared in contact with his orb, and continued visible for thirty minutes and then were hidden by a cloud. On the 28th of February, 1551, mock-suns were seen at Antwerp; and on the 17th of March of the same year, a similar phenomenon, with two halos, was witnessed at the same place. Four days after the last named, two parhelia, with three halos, were seen at Magdeberg.



HALOS AND PARHELIA.

Scheiner witnessed a singular one at Rome, on the 20th of March, 1629. From the zenith as a centre there was seen a great white circle, having the true sun in its circumference; this was intersected by two concentric circles around his disk. Where the outer of these smaller rings cut the zenithal circle, two parhelia appeared, and in the great circle, nearly opposite to these, but separated by a wider arc, two others were visible.

Gassendi describes a very remarkable instance of this phenomenon, which was seen in 1630. Around the sun were two concentric

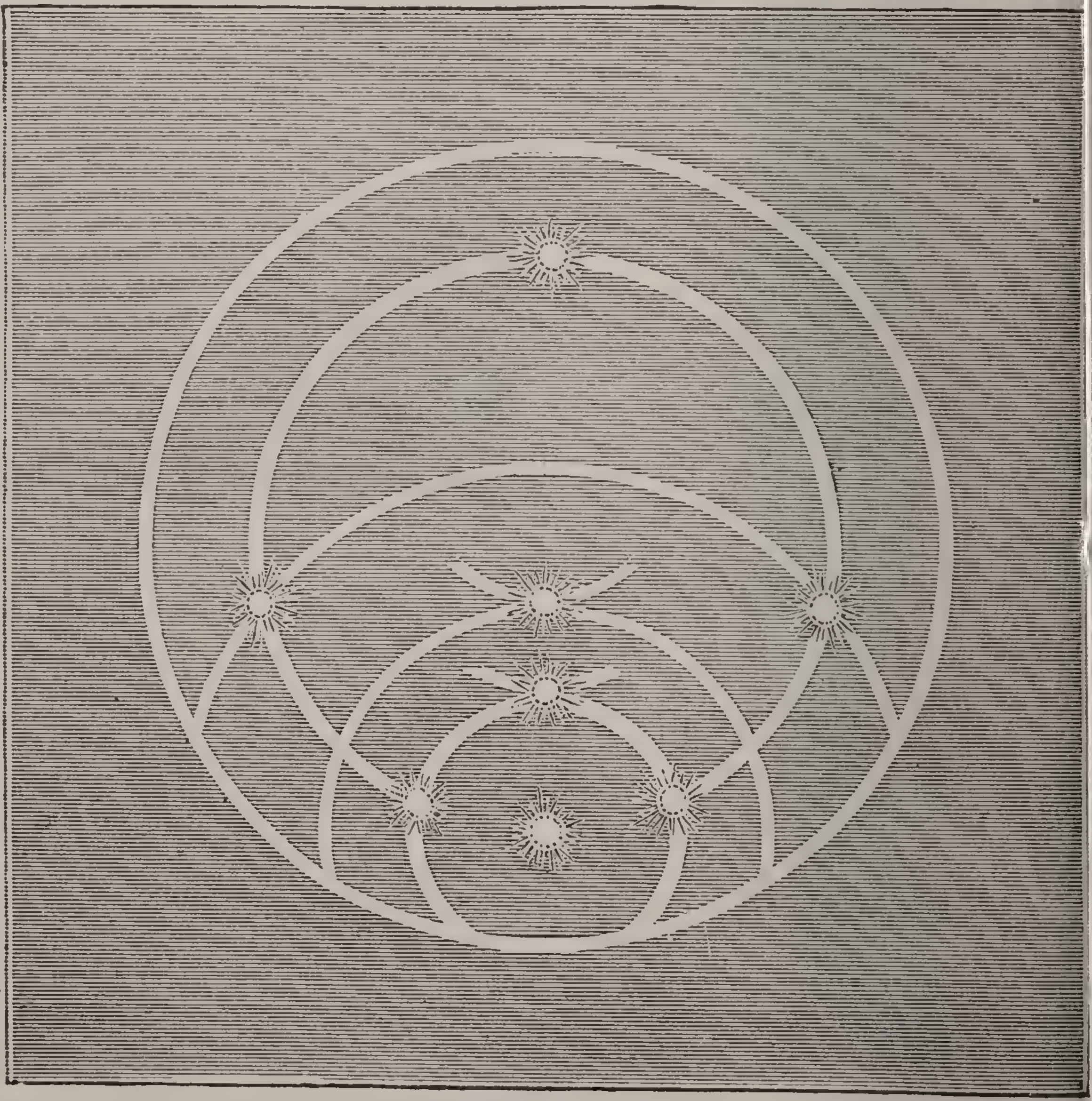


PARHELIA OBSERVED BY GASSENDI.

halos; the larger cut the horizon, and consequently was incomplete; these were colored like the rainbow, excepting that the red was internal. In the direction of the zenith, there was a tangental arc external to these halos; and with the zenith as a centre, a great white circle ran parallel with the horizon, having the true sun in its circumference. At the five intersections of these circles and arcs parhelia appeared, and a sixth was seen in the internal halo between the true sun and the zenith.

One of the finest meteors of this kind on record was seen by Hevelius, at Sedan, on the 20th of February, 1661. "A little before 11 o'clock," he says "the sun being towards the south and the sky very clear, there appeared seven suns together, in several circles, some white and others colored, and these with very long tails waving and pointing from the true sun, together with certain white arches crossing one another. The true sun was about 25° high, and surrounded almost entirely by a circle whose diameter was 45°, and colored like a rainbow with purple, red and yellow, its under limb being scarcely 2½° above the horizon.

On each side of the sun, towards the west and east, there appeared two mock-suns, colored, especially towards the sun, with very long and splendid tails of a whitish color, terminating in a point. A far greater circle encompassed the sun and the former lesser circle, and extended itself down in the horizon. It was very strongly colored



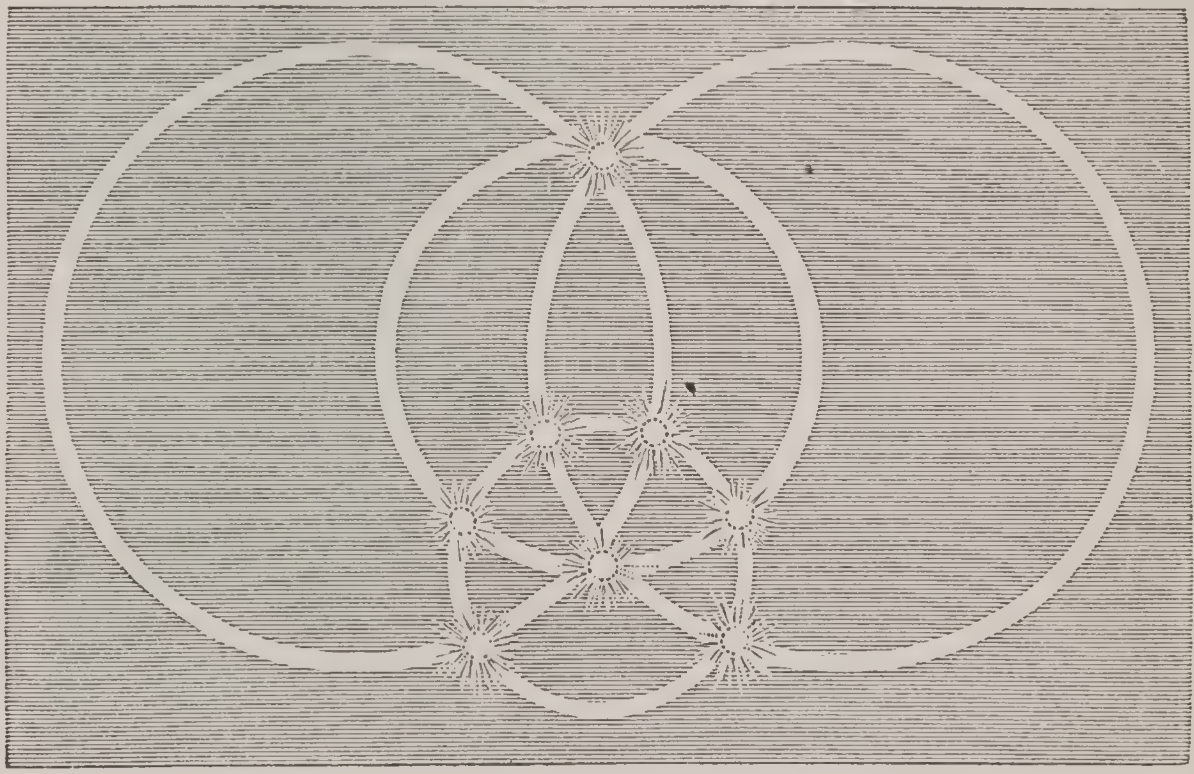
PARHELIA OBSERVED BY HEVELIUS.

to its upper part, but was somewhat duller and fainter on each side. At the tops of these two circles were two inverted arcs, whose common centre lay in the zenith, and these were very bright and beautifully colored.

In the middle of the lower arc, where it coincided with the circle, there appeared another mock-sun, but its light and colors were dull and faintish. There appeared a circle much bigger than the former, of a uniform and whitish color, parallel to the horizon, which arose, as it were, from the collateral mock-suns, and passed through three other parhelia, of a uniform whitish color like silver. There passed also two other white arches of the greatest circle of the sphere through the eastern and western parhelia, and also through the pole of the ecliptic. They went down to the horizon, crossing the great white circle and obliquely, so as to make a white cross at each parhelion; so that seven suns appeared very plainly at the same time. This phenomenon, with certain changes in the brightness of its several parts, continued visible for an hour and twenty minutes."

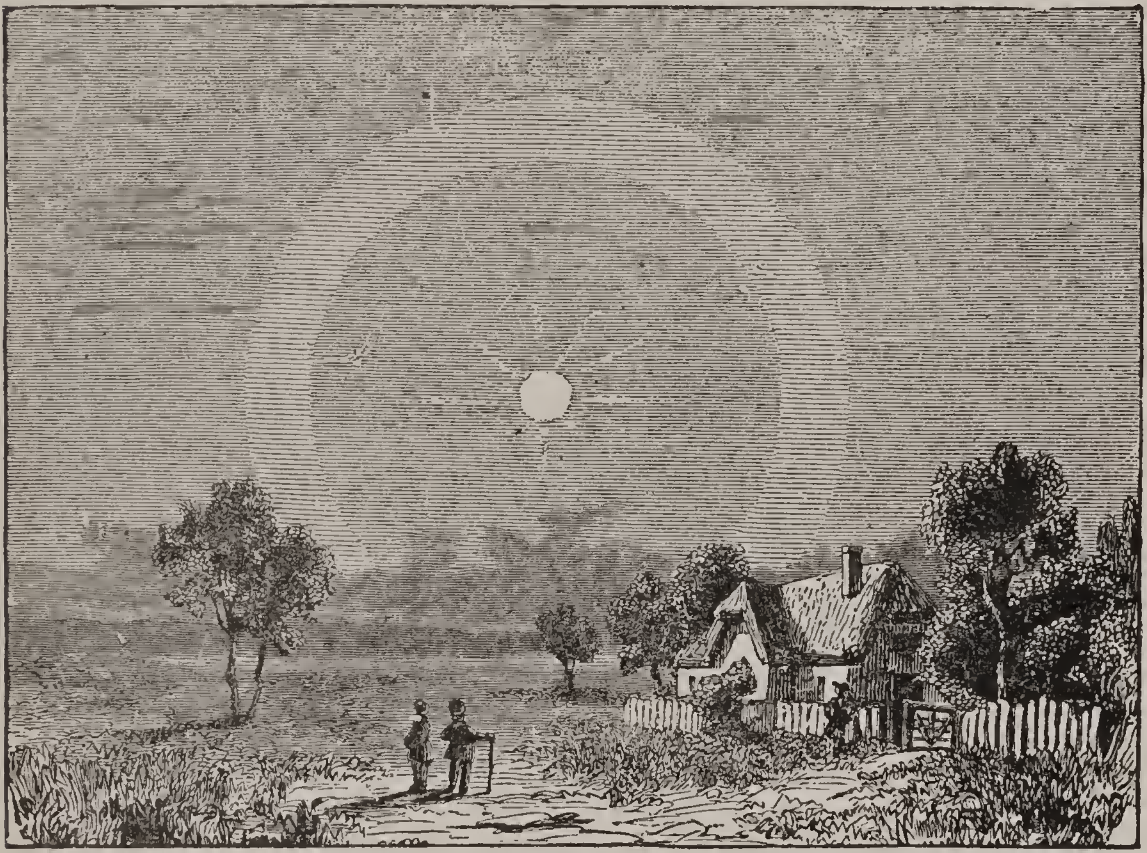
Such parhelia have been observed at various times and places in North America. Barker describes a curious halo with accompanying mock-suns, which he saw at Fort Gloucester, near Lake Superior. A circle with tangental arc surrounded the sun; about midway between the horizon and zenith, a circle ran parallel to the horizon, having the sun in its circumference; in this horizontal circle there appeared altogether five mock-suns, with this peculiarity, that, directly opposite the true sun in this great circle, a St. Andrew's cross was seen, the upper limbs of which extended higher above, than the lower one descended below, this circle; in the intersection of this cross and the circle, one of the parhelia was placed. A very curious system of circles, with several mock-suns, appeared on the 19th of August, 1825, at Jackson, Tennessee.

An exceedingly curious optical appearance belonging to this class of phenomena, was observed by Mr. Fallows, at the Cape of Good Hope, when the sun's disk was just dipping in the ocean. On either side of the true luminary, and within the breadth of a degree and a half of his disk, four mock-suns appeared on the left, and three on the right. They had the same shape as the true sun, touched the water at the same instant, and all of them disappeared together, shining as bright spots upon the water's edge. This magnificent scene occurred on a delightful evening, when not a cloud was to be seen.


PARHELIA OBSERVED IN TENNESSEE.

Such are a few of the marvelous appendages which the vapors of the atmosphere sometimes create around the great luminary of the day.

Now, evanescent as is the nature of all these meteoric phenomena at which we have glanced, and irregular as their occurrence may be, yet they are in no sense to be regarded as the result of chance. On the contrary, we see in them the play of exact and beautiful laws. All are produced according to the principles of order established in the beginning, by the One Supreme Lawgiver. In all, brightness and shade prevail in their ordained degrees; and heat and cold produce their designed effects in sea and land and sky. The sunrays in their passage through visible mists, or viewless vapors, are reflected, refracted, and absorbed, according to uniform rules.



BRIGHT HALO IN NORWAY.

The diameters, distances and intersections of the encircling halos are all measured off after the undeviating principles of geometry. Every tint and shade in their coloring, and every facet and angle in the frozen particles that produce them, display the operations of the unerring laws of optics. Invisible vapors, icy crystals, luminous arches, colored halos, splendid parhelia—all proclaim the observance of law and order. And though the whole magnificent diorama may fade and vanish within the brief space of five minutes, yet, in its production, nothing has been slighted, nothing imperfectly formed, nothing left to be determined by chance.

If a pebble be dropped into the bosom of a still and smooth sheet of water, a circular depression is formed, at the point where it sank, which spreads wider and wider, with uniform velocity. In the meanwhile an elevation has been formed at the point where the pebble, in entering the water, had originally caused a depression; then as this sinks back to its original level it produces a wall-like circular elevation around it, which follows up the preceding circular depression with equal velocity. Whilst the water continues its up-and-down movement at the point struck, fresh wave-rings appear to proceed from this central point, which, owing to their constantly spreading more and more widely, give the illusory appearance of the fluid steaming out on all sides from the middle point.

Now, let us suppose that, instead of one pebble, two are dropped into the water at the same instant, but at a short distance one from the other. We shall have then two systems of circular waves moving and spreading out as before. As these two systems intersect each other, they divide the surface of the water into a regular net-work of small elevations and depressions, as represented in the annexed figure. Yet the one does not destroy or efface the other; at the points where two wave-crests meet, the surface of the water, if the two waves are equal, rises to twice the height, and where two depressions meet, it sinks to double the depth.

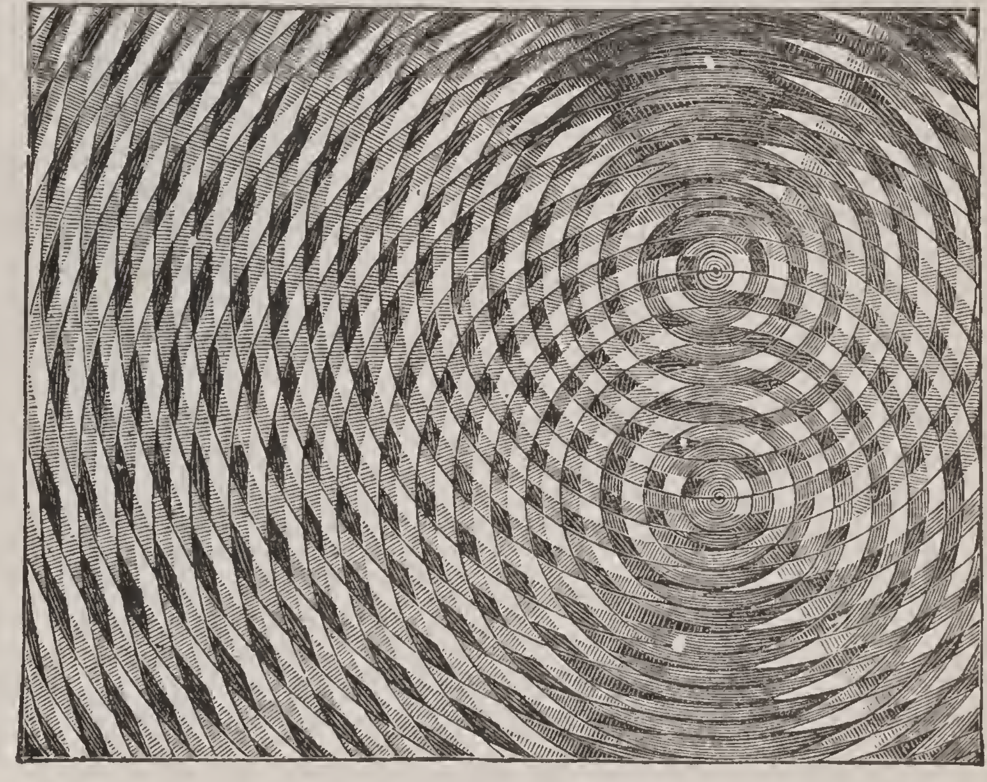
Thus each wave maintains and extends unbroken its circular and moving form, as if it had the entire surface to itself. And if, instead of two, we had three, or in fact, any number of pebbles dropped, the same result would be produced by each of them. In other words, it may be said, that every wave system superimposes itself upon, or adds itself to, a surface already moved by waves, as it would do were it acting alone on that surface at rest. Every wave system forms itself unhindered by those already present, and spreads after it has crossed these, upon the still quiescent surface of the water.

Large and Small Waves.

Once more: suppose that when we have flung a handful of pebbles upon the water, each creating its little system of spreading waves, a succession of large billows or swells be produced by the wind or a passing steamboat, we shall see that even these do not destroy the little waves of the pebbles, but take them on their backs, and having passed, leave them behind with their original forms and motions unaltered. Of all this we may witness a beautiful illustration when large drops of rain begin to fall upon the agitated surface of a lake or river.

Now, similar results, though invisible, are produced in the atmosphere by a blow on a drum or a bell, or by any number of such blows given in succession. These aërial vibrations, like the waves upon the water, do not destroy or extinguish one another. If a whole orchestra, composed of numerous and diverse instruments, play a piece of music together, each pipe and each string will create its own system of vibrations, which will pass outward through the atmosphere without disorder, each being endowed with an individuality as indestructible as if it alone had disturbed the quietude of the still air.

If now we advance to the far more attenuated and elastic medium of light, the ether, we shall find the same law still hold good. Here, as in the water and in the air, one system of vibrations, whether set in motion immediately by the sun, or by reflection of the sun's rays from some terrestial object, does not interrupt or confuse another system. Each, though it may have crossed a hundred or a thousand others, maintains its existence and its identity unchanged, and bears on its bosom a correct and clear representation of the centre or object from which it has proceeded. These radiant vehicles of light are infallible in their progress and office; from ten thousand points, and in ten thousand directions, they unceasingly carry and imprint the messages of the world and of the universe.



INTERSECTION OF TWO WAVE SYSTEMS.

If we enter the garden, and bend over a bed of diverse flowers, we shall find that each green leaf and each variegated petal sends forth its little system of ethereal vibrations, announcing infallibly its particular form and color. If we stand confronted by a regiment of soldiers, the countenance of each individual, in like manner, sends forth its system of vibrations, and all meet in the eye, and imprint their pictures of those countenances on the retina within a circle that does not exceed in circumference that of a dime—not one is omitted; not one is blurred. Light treats all objects alike.

Our Solar System

A FINE family of planets is that over which the sun presides, and an accurate description of these will be of interest to the reader. We are now speaking of the orbs that revolve around him.

MERCURY.

Above the sun, in the west, when that radiant body sets, or again before its rising in the east, is seen sometimes a small white star, slightly tinged with red. The Greeks call it Apollo, god of day, and Mercury, the god of thieves, who take advantage of the night to commit their misdeeds; for they saw in it two different planets, one a morning and the other an evening one, as they did also for a long time in the case of Venus, the Egyptians and Indians doing the same. The former gave it the names of Set and Horus; the latter those of Boudda and Rauhineya; names which bring to mind, like the preceding, the divinities of day and night. The Latins who, however, employed themselves very little with astronomy, in this respect remained in doubt. It has been only in later times that the identity of these two stars which, like Castor and Pollux, to which they are assimilated, never appear together, has been proved; its evening name Mercury, was the one retained.

Being the first planet of the system, Mercury always remains absorbed in the royal radiation of the prince of day; also, like a courtier, it is deprived of its individuality and blended in the personality of the ruling star. It gains nothing and loses much, seeing that it had not the honor of being known to the founders of astronomy. Copernicus despaired of ever seeing it: "I fear," said this great man, "that I shall descend to the tomb without having seen the planet." And, indeed, he who had transformed the system of the world, and taken in hand each of the planets to place them round the sun, died without having seen the first amongst them. Galileo was able to observe it, thanks to the glasses which he had invented, but it could not be said that he understood it sufficiently, as it was impossible for him ever to distinguish its phases.

The adversaries of the new system opposed the first astronomers, Copernicus, Galileo, and Kepler, on account of the absence of phases in the planets Mercury and Venus. "For," said they, "if these planets revolved around the sun, they would change their aspect to our eyes, as the moon does, according as we see in front, in profile, or in rear, the illumined part, the side in fact which they turn towards the sun."

Copernicus and his colleagues replied, 'We do not distinguish any phases, it is rue; but if it only requires them in order hat you should adopt our system, God will cause that there may be some." Indeed there were some. By the observaion of the irregularities visible in the nterior of the crescent or quarter, it has been observed that Mercury is rugged with high mountains, higher than those of the earth, although Mercury is a much smaller globe than ours. The existence of a denser and higher atmosphere than ours has been suspected.

Grotesque Romances.

In the middle of the last century, one of the numerous romancers who feigned voyages to the planets, pretended to know hat the mountains of Mercury were all crowned with beautiful gardens, in which grew naturally not only the most succuent fruits which served as food to the Mercurians, but also the greatest variety of dishes. It is better, perhaps, to believe his than to think with Fontenelle, that he inhabitants of Mercury are all mad, nd that their brains are burned with the iolent heat which the sun pours upon their heads. But until an authentic voyager has made us sufficiently acquainted on this head, we will confine ourselves to the astronomical lements of the planet.

It revolves at a distance of 35,000,000 of miles from the sun; its diameter is 2960 miles; its day is 24 hours, 3 minutes, 28 seconds long; its year, 87 days, 23 hours, 14 minutes; and its seasons, 22 days only; its mass, compared to that of the earth is only $\frac{17}{100}$; its density is three times more than ours, and bodies which fall on its surface travel 7.45 feet during the first second of fall; and, lastly, it receives six times and a half more light and heat than the earth does.

CELEBRATED ASTRONOMERS.

COPERNICUS.
GALILEO. ISAAC NEWTON.
KEPLER. TYCHO BRAHE.

VENUS.

Thou little sparkling star of even,
Thou gem upon an azure heaven!
How swiftly will I soar to thee
When this imprisoned soul is free!

The young poetess who sang this charming song, Maria Lucrecia Davidson, escaped from her earthly prison towards her well-beloved star when she had scarcely seen her seventeenth spring blossom forth. Some ill-disposed minds have asserted that although Venus is beautiful afar, it is frightful on a nearer view. We fancy our young and amiable readers are not of this opinion.

Indeed all the magnificence of light and day which we enjoy on the earth, Venus posseses in a higher degree. Like our globe, it is surrounded by a transparent atmosphere, in the midst of which are combined thousands and thousands of shades of light. Clouds rise from the stormy ocean, and transport into the sky, snowy, silvery, golden and purple tints. At morning and evening, when the dazzling orb of day, twice as large as it appears from the earth, lifts its enormous disk at the east or inclines towards the west, the twilight unfolds its splendors and charms. From here we can be spectators of this distant spectacle; for we distinctly see the daybreak and the close of day in the plains of Venus.

CRESCENT AND SPOTS OF VENUS.

Day and night are of nearly the same duration as on the earth; the diurnal period of rotation of the planet is twenty-three hours, twenty-one minutes, seven seconds; it is consequently thirty-five minutes less than ours. Its year is two hundred and twenty-four days. Its mountains are much higher than ours. The inequalities which are noticed in the interior of the crescent are the highest points of the surface which still receive the sun's rays after these have lef the plain. The height can be conclude from the time that these light-points take t disappear.

Rapid Motions.

We have just spoken of Venus as a crescent. Like Mercury, this planet is situate between the earth and the sun; and th circle which it describes during its year i comprised in the circle which the eart describes round the same body. Henc it follows that at certain epochs the plane Venus is exactly between us and the sun and then it presents its dark part to us, as it illuminated portion is naturally on the sid of the sun. At other times when it is to the right or left o the sun, it presents only a quarter. Lastly, when Venus is on the other side of the sun, it presents its entire illuminated portion to us. At such times it is one of the beauties of the firmament, a gem of the first water.

The phases of Venus were seen for the first time by Galileo in the month of September, 1610, who beheld this spectacle with a joy impossible to describe, seeing that it eloquently testified in favor of the system of Copernicus, showing that like the earth and moon, the planets receive their light from the sun. When we say that these phases were for the first time seen in the month of September, 1610, you must not conclude that they did not exist before that epoch, but you must understand, that before that year no one had turned the telescope to the planet, and that with the naked eye, these phases are imperceptible.

According to the custom of the period, the illustrious astronomer disguised his discovery under an anagram, to maintain the authenticity of this discovery in case of rivalry, and to give himself time to continue his observation and to perfect them. He finished a letter with this phrase: "*Hæc immatura a me jam frustra leguntur, d. y.*" which means, "These things unripened and as yet hidden to others, are at length read by me."

Under this cryptogram, it would be difficult to discover the idea of the phases of Venus. Our farthers were very ingenious, and in the present time certain discoveries would not have been so greatly contested, if astronomers had sometimes used the same ruse. In this phrase there are thirty-four letters. By placing them in another order, we get hese words, in which the whole discovery is elegantly inscribed: "*Cynthiæ figuras emulatur mater Amorum.*" "The mother of the Loves puts on the phases of the moon."

A Shrewd Reply.

Galileo was very cunning. Two months ater, Father Castelli asking if Venus had hases, he replied, "My state of health is ery bad, and I find it better to be in my ed than in the dew." It was only two lays before the end of the year that he nnounced the above discovery.

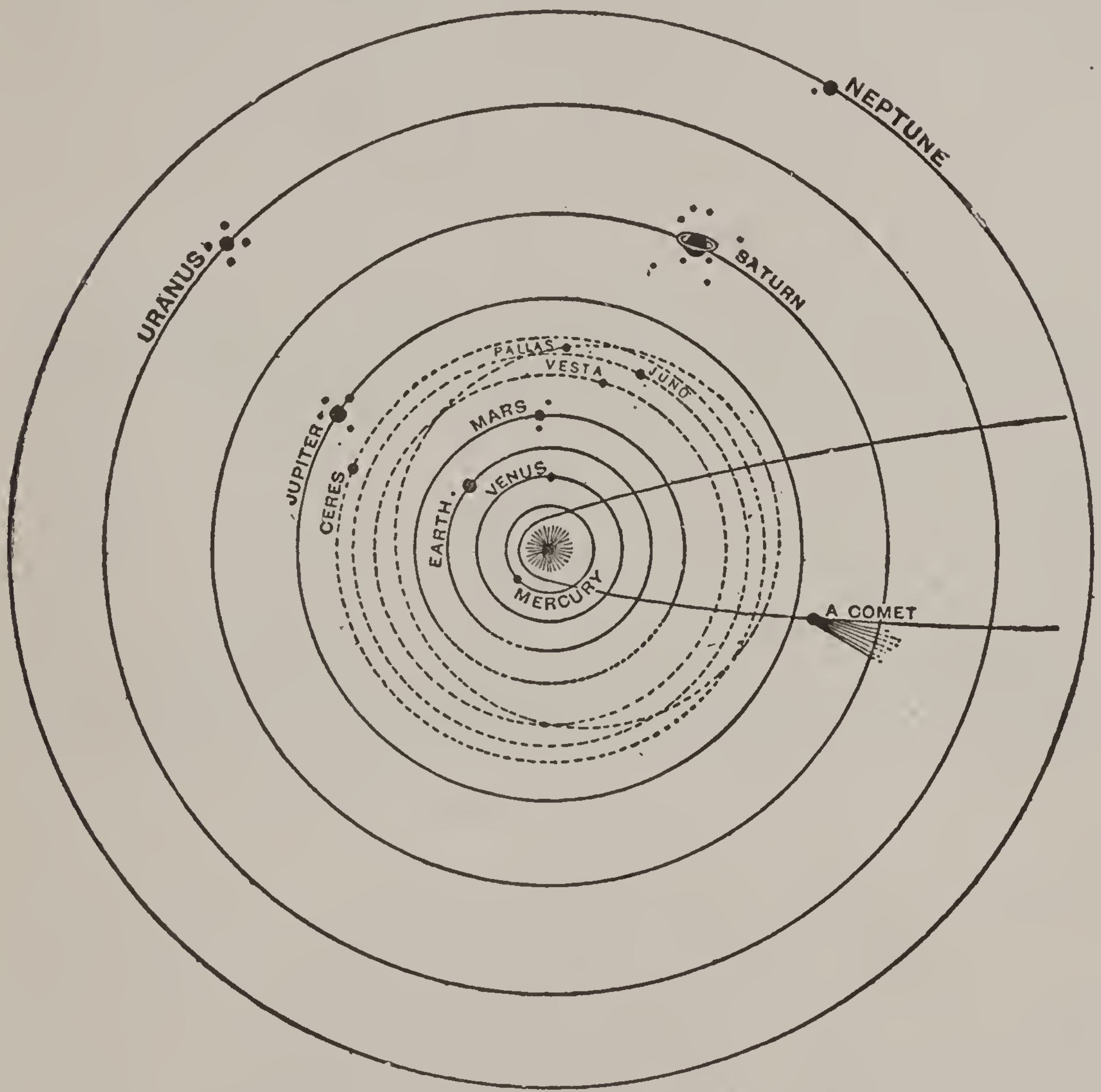
This globe presents the greatest semblance to our own, and it has nearly the ame astronomical elements, size, volume, veight and density; only it is much nearer o the sun than we are. From the commencement of ancient poetry, its position ear the sun, which causes it to appear at unrise and sunset, attracted contemplative inds towards it. In the middle ages, a orthy father took an ecstatic voyage in e heavens, and in Venus saw only young eople of ravishing beauty, living in the idst of perfect happiness; in his sight, ese were the guiding spirits of the planet Venus, for in olden times it was believed that a legion of angels or genii presided over the direction of each of the heavenly spheres.

MARS.

All the maledictions of mortals have fallen on Saturn and Mars. Beginning with war, that scourge of humanity of which it will have great trouble to rid itself, all public misfortunes caused by power have been attributed to Mars, which, if it knew what the earth thought of it, ought to regard us with an evil eye. It is, nevertheless, innocent of all these calumnies, and we ought not to speak ill of it, presenting, as it does, most resemblance to ourselves. Indeed the world of Mars resembles the earth so much, that if we happened one day to be traveling there and lost our way, it would be almost impossible to recognize which of the two were our planet. Without the moon, which would charitably remove our uncertainty, we should run a great risk of arriving amongst the inhabitants of Mars, expecting to descend into the United States, or some other terrestrial quarter.

Indeed, the planet Mars in our telescopes presents the same aspect as the earth must do to the inhabitants of Venus; a circular disk, rather flattened, turning on itself in about twenty-four hours, furrowed from time to time by fleeting clouds, diversified with here dark and there light plains, revolving obliquely on an axis enveloped with an atmosphere and with snow-covered poles. On this planet the seasons are nearly of the same intensity as our own, but their duration is twice as long; for Mars only accomplishes its annual revolution around the sun in 1 year, 321 days, and 22 hours, or 1 year, 10 months and 21 days.

We may notice certain differences between the aspect of Mars and our own world. Whereas the earth seen at a distance must appear tinted with green, on account of the color of its atmosphere, its vegetation and water, Mars is shaded with red, and it is this shade which gives it the reddish light with which it is seen to shine. Doubtless this characteristic color is produced by the dominant coloring of its surface; either its soil is thus colored like that of our deserts, or its seas, its vegetation, or the vapors rising into its atmosphere, are chiefly clothed with this shade. Nevertheless, the poles always preserve their brilliant light. In 1837, it once happened that Mars was, during the observations, completely darkened by a cloud, with the exception of the poles which stood out distinctly.



THE SUN, PLANETS AND COMET.

Removed from the sun to a mean distance of 139,000,000 of miles, and encircling the the earth's orbit in that which it describes round the central body, there are certain periods where these planets are very nea together; that is, when they are both o the same side of their path with regar to the sun. Sometimes they are not mor than 48,000,000 of miles distant from eac other. Mars has two satellites, which hav been discovered at a comparatively recen date.

The conjunction of two planets is th point of their orbits where they are on th same side of the sun, and are the neares possible to each other; the ter opposition is given to the opposit point of their paths, when the are on opposite sides of the sun except in the case of Mercury an Venus. In olden times thes positions greatly exercised th sagacity of horoscope-seekers, an human destinies received fancie predictions, according as the go of war was in conjunction in suc and such a sign of the zodiac.

The Little Worlds.

The interior planets, Venus an Mercury, whose orbits are en closed in that of the earth, hav no opposition, but they have tw conjunctions; the superior, whe the planet is beyond the sun an in one right line; the inferio when it is situated between the sun and t earth. The exterior planets, those whic enclose the terrestrial orbit, and of whic Mars is the first, have only the superio conjunction.

At about 80,000,000 of miles, beyond th planet Mars, between the orbit of this plane and that of Jupiter, we meet with the grou of small planets, of which we have alread spoken. These are very little worlds, even they deserve this name, which hav arcely the extent of a province, or even a partment. They gravitate in this zone in nsiderable numbers, for there may exist veral thousands. Perhaps they are *débris* a larger world, shattered by some catas- phe; perhaps they have been formed in s region of space in the fragmentary state which we now see them.

Putting aside the title of original greatness these asteroids, and the fate which attends em, let us traverse their colony, and yond it get near the most magnificent of worlds of our system.

JUPITER.

She said:
Oh! that it were my doom to be
The spirit of yon beauteous star,
Dwelling up there in purity,
Alone, as all such bright things are:—
My sole employ to pray and shine;
To light my censer at the sun!

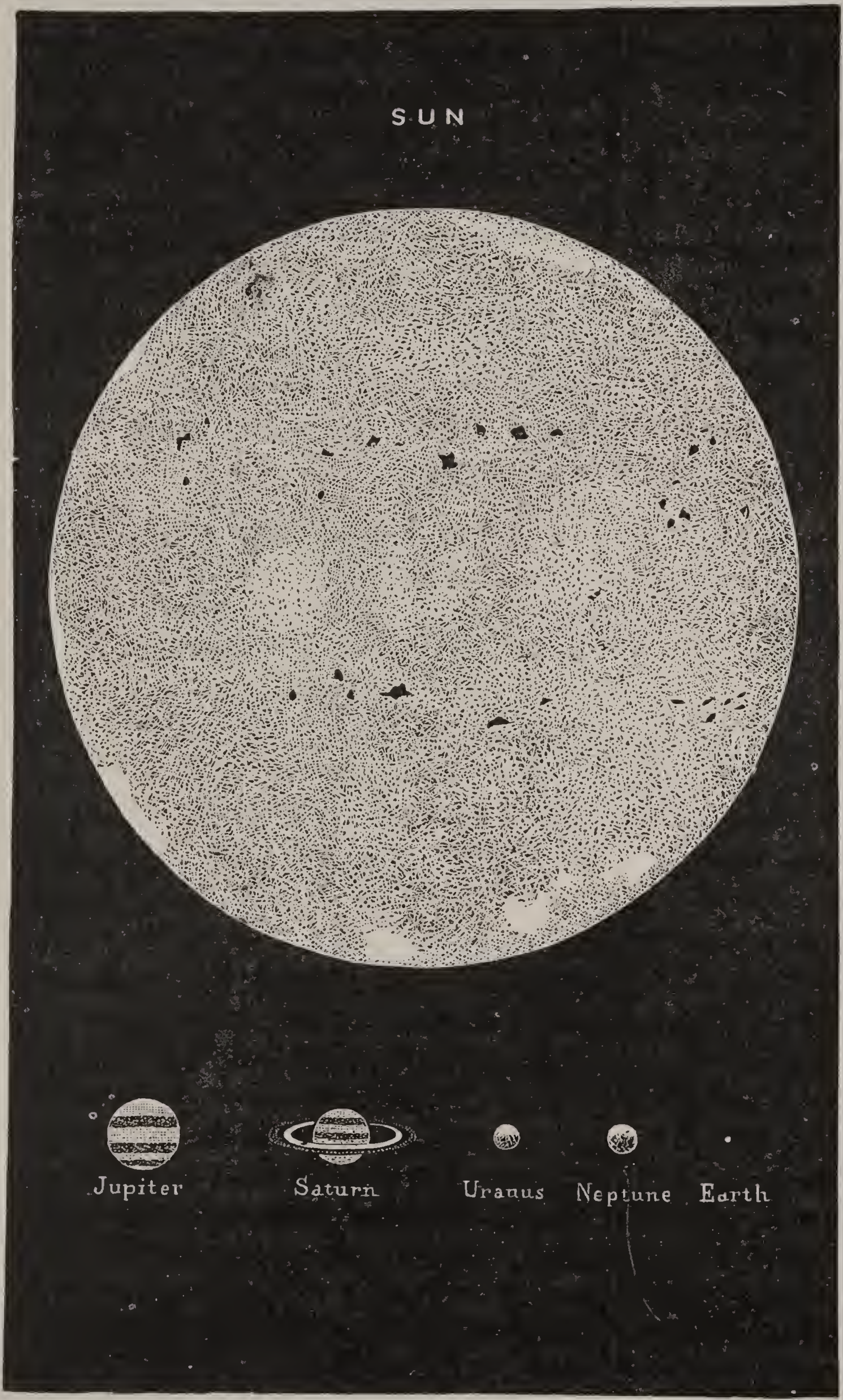
The orb of Jupiter is more bulky than all other planets of our system; it is only a usand times smaller than the sun, which kes it, if we remember the volume of that iant body, from fourteen to fifteen hun- d times larger than the terrestrial globe. so, although it revolves in an orbit nearly ,000,000 of miles distant from the sun, l receives a much fainter light than that eived by the earth, its size is evidenced by light with which it shines during our ry nights, equal and often superior to t with which Venus shines. Jupiter is refore reckoned among the most beautiful ects of the heavens. As it is always in zodiac, and when Venus is visible in the ning, it is always in the west, it is easily ognized. At whatever period of the year, refore, you see a very bright star, either the east, or high up among the zodiacal stellations, you may be certain that it is iter.

This planet is a charming one, so far at least as we are able to judge from afar and without going there. To begin with, a continual spring rejoices its surface. If it is ornamented with flowers, which we do not doubt, though we know not of what these flowers consist, they do not only survive "the span of a morning," as our roses do, but live much longer. Scarcely have the oldest begun to dry up and fade but they are replaced by lovely buds, opening before the first have died away. Not only is the Jovian year equal to twelve of ours, but it is scarcely known when the yearly period begins or ends.

The King of the Planets.

Then Jupiter presents a surface 126 times more extensive than the terrestrial surface. We speak of surface, not volume. Now, a hundred and twenty-six earths placed side by side, and on which the human race would be able to spread itself at will, would constitute a very fine country. We ought, then, not to doubt that such an empire has been formed to serve as an abode for a race of beings, venerable and worthy of our respect. We reason thus of Jupiter, because we have had the necessary means to measure and appreciate it at its just value. But it is necessary to add something to complete the comparison between this world and our own.

Because we find, by observation of the Jovian planet, excellent reasons for believing that its inhabitants are very favored, it does not follow that the aforesaid inhabitants make similar reflections on us. There is a very good reason why they do not occupy themselves with us—they are probably not acquainted with our existence. And, indeed. if ever, at a future time, more or less distant, you should happen to inhabit Jupiter, you would have great trouble to discover your old country. To do so you would have to rise a little before the sun (and mark,



RELATIVE SIZES OF THE SUN AND PLANETS.

there are only five hours from the setting to the rising of this body on Jupiter) and five
or six minutes before the rising look to
east for a very small white star. With g
eyes, you perhaps wo
perceive it. In this c
you would know that
earth exists.

Again, you would m
the same search six mor
later, at the west, a
moments after the set
of the sun. Such is
condition of the inhabita
of Jupiter with regard to
They can never see
earth during the night,
though it is precisely
the middle of clear nig
that we are best abl
observe this magnific
planet.

SATURN.

If you were to tak
journey to the planet
urn, which is scarcely m
than 900,000,000 of m
from us, you would fee
approaching it an unsp
able astonishment, to wl
certainly no sentimen
surprise felt on the e
can be compared. Ima
an immense globe, not
of the size of the earth,
as large as 734 earths
together. It revolves
an axis with such rapic
that in spite of its siz
accomplishes its diu
rotatory movement
about ten hours. Arc
it, at 20,000 miles distance above its equ
an immense ring, flat and relatively very

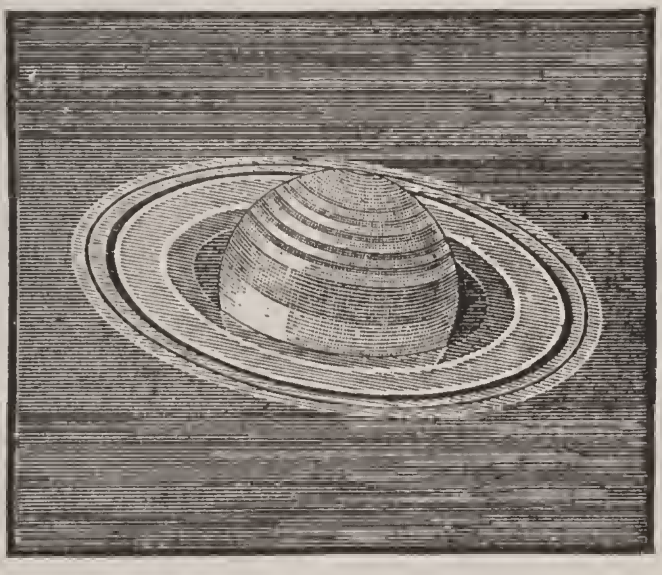
rounds it on all sides. This ring is fol-ved by a second, and this one by a third. Now this system of multiple rings is only few miles thick, while its diameter is ,000 miles. They do not remain im-vable, but are carried along with a circular vement round the planet, this movement ng of still greater rapidity than that of the net itself. The domain of the Saturnine rld is not confined to this. Beyond the g, eight moons are seen revolving in the vens around this strange system; the rest of these satellites is separated from planet's centre by a distance of 120,000 es; the most remote has an orbit of 93,000 miles from the centre of the net. Saturn then governs a system which asures not less than four and a half millions miles in diameter.

By the side of this world the earth makes a poor figure, and Micromegas, in the e, was to be pardoned when on coming of Saturn he mistook the earth for a ehill. Its years are thirty times longer ours; of its seasons each lasts seven s and four months; a change remarkably that which distinguishes our own diver-s them; a regenerating spring succeeds rigor of winter; summer and autumn forth their alternate fruits.

URANUS.

n the 13th of March, 1781, between ten eleven in the evening, a quondam organ-f Halifax, who had himself made the telescope then in existence, observed small stars of the constellation of the s, with a telescope of nine feet focal h, and a magnifying power of 227. ng his observation he perceived that of the stars presented an unusual dia-r. Astonished and desiring to prove fact, he took an eyepiece magnifying double, and found that the diameter of the star increased whilst that of the others remained the same. More and more surprised, he fetched his magnifying power of 932, being quadruple that of the first, and again observed it. The mysterious star was still larger.

From that time, he no longer doubted; this was a new body, not a star. He continued the following days, and noticed that it slowly moved among the others. It was then a comet. Herschel described it to the Royal Society in a paper entitled, "Account of a Comet;" and the scientific world of all countries registered this new cometary body, and set about observing it in order to determine its orbit. If Herschel had directed his telescope towards the constellation of the Twins eleven days sooner, said Arago, the real movement of Uranus would have escaped him, for this planet was on the second at one of its stationary points. It may be seen by this remark on what the greatest astronomical discoveries depend.



THE PLANET SATURN.

The name of the astronomer was then so little known that it is found written in every way; Mersthel, Herthel, Hermstel, Horochelle. Nevertheless, the discovery of a new comet was an event important enough to induce a study of the new body. Laplace, Mechain, Boscowich and Lexell endeavor-to determine the orbit along which it moved. Many months elapsed before the astronomers guessed that it was a real planet ; and it was not until after having observed that all the imagined orbits for the pretended comet were soon contradicted by observation, and that it probably had a circular orbit, much more distant from the sun than Saturn, until then the boundary of the system, that they agreed to regard it as a planet.

The New Member of the Family.

Still this was but a provisional agreement. It was, indeed, more difficult than was thought thus to increase unscrupulously the family of the sun. Many reasons of propriety were opposed to it. Old ideas are tyrannical. It had been the custom for so long to regard the venerable Saturn as keeper of the frontiers, that it required a great effort to determine upon extending these frontiers, and guarding them by a new world. It happened in this as in the discovery of the small planets situated between Mars and Jupiter.

Two years before this discovery was made, Kepler imagined, for the harmony of the world, a large planet in this space, and the most frivolous and senseless considerations were urged against it. For instance, they reasoned : "There are only seven openings in the head, the two eyes, the two ears, the two nostrils, and the mouth ; there are only seven metals, there are but seven days in the week, therefore there are but seven planets," etc. Considerations like these, and others no less imaginary, often hinder the progress of astronomy.

When William Herschel, having been present as a spectator at the debates created by his discovery, came to the belief that his comet was a planet situated at the confines of our system, he claimed the right, whi was indisputably his, of christening the n star. Animated by a lawful motive of gra tude towards George III., who had app ciated his astronomical worth and given h an annual pension, he at first proposed t name of Georgium Sidus, George's star, Galileo had called the satellites of Jupi discovered by him, the Medici's stars, a as Horace had said Julium Sidus.

Others proposed the name of Neptune, order to preserve the mythological charact Saturn would be thus found between two sons, Jupiter and Neptune. Oth added to Neptune the name of George I others again proposed Astræ, consider the goddess of Justice was as far as possi from the earth ; Cybele, mother of the go Uranus, the most ancient of all to wh reparation was due after so many hund years of neglect. Lalande suggested H schel's name to immortalize the discove These two denominations prevailed.

For a long time the planet bore name of Herschel, but custom has si declared for the mythological appellation Uranus. The discovery of Uranus has creased the radius of the solar system fr 872,000,000 of miles to 1,753,000,0 Compared with the preceding, this plane not very large, for it is scarcely eighty-t times more bulky than the earth. Its seas last twenty-one years, of ours, and its ye eighty-four years and a quarter. Aro it revolves eight satellites, six of which H schel himself discovered.

NEPTUNE.

The world which here marks the front of the system, is situated at such a dista from the sun, that the light and heat wl it receives from it are thirteen hunc times less than that with which the e is enriched, so that no great difference can be noticed between the day and night of this distant planet, and to it the solar disk is nearly reduced to the smallness of the stars.

In Eternal Twilight.

Two billions seven hundred and forty-six millions of miles is the distance which separates this world from the sun. Until the time of its discovery, the frontiers of the planetary system already augmented by the addition of Uranus, were confined to an orbit of 1,753,000,000 of miles in radius. Does this, then, imply that these are the utmost limits, and that analysis will not be able to go further and add fresh members to the already increasing family of the sun? No; when observations spreading over a long series of years shall have been made, and compared with each other, the universal law of gravitation by which the existence of this planet was known before ever being perceived in the field of the telescope, will prove the existence of others if others exist, which is probable; and the progress of optics following equally the progress of astronomy will give to the visual power, again magnified, the power to discover such distant planets which will, doubtless, be of the sixteenth or seventeenth magnitude.

Imagine a body a hundred times larger than the earth carried into the gloomy deserts of space to the distance of the Neptunian orbit. It floats, isolated, in the obscurity of space, following an immense but purely ideal curve, and which exists only in theory in the decree of eternal laws. It follows this curve, and revolves on itself without ever deviating from its path. To finish its immense route and return to its starting point, it requires one hundred and sixty-four years. It will return and again pass through this mysterious point of space which it passed nearly two centuries before.

What power moves it? What hand guides this blind body through the night of the distant regions, and what causes it to describe this harmonious curve? It is universal attraction.

Instead of following a regular ellipse round the sun, the planet Uranus underwent, from some unknown cause, a perturbation, which retarded its theoretical path, and extended its circular curve towards a certain point, as if an attractive cause had seduced the traveler from its path, and had made it deviate from its proposed route. It was calculated that, in order to produce at this point an attraction of such intensity, it was necessary that there should be on that side of the system beyond Uranus, a planet of a certain mass, and at a certain distance.

A Remarkable Discovery.

Two astronomers, the one French, the other English, set to work at the same time in this research. They discovered the disturbing cause theoretically, and observers directed their telescopes to the spot thus indicated by theory. They were not long in actually discovering the body near the spot pointed out, and they were able to announce to the world the most brilliant confirmation of universal gravitation.

This discovery justly ranks as one of the most celebrated among the dazzling triumphs of astronomical science. If anything in creation might be expected to be circumspect and steady, it is one of the planets, like Neptune, that helps to form the solar system. But like a swift-running locomotive, it swayed, trembled, threatened to leave the track. "Surely," said the astronomer, "there must be some world beyond that is drawing it." And there was.

The Earth's Satellite

OUR earth is not rich in respect to satellites, possessing as it does only one, which, however, is of dimensions ample enough as compared to it; this is the moon, the faithful companion of its course. Other planets, it is true, like Jupiter and Saturn, are more richly endowed, and have from four to eight satellites; but again there are others which do not possess any, as is the case with Venus and Mercury.

The sole and faithful satellite of the earth, formed by a fragment detached from it, now cold and wan, rolled round us when it began, a red and blazing sphere, vomiting torrents of fire from its whole surface. Whilst gravitation was regulating its form and path, the moon, in the course of thousands of years, exhausted its fires to show us at last its pale and silvery face, the sad luminary of our nights, the splendid nocturnal mirror which reflects to us, pale and cold, the divergent rays of the sun.

Compared to the immeasurable distances of the nebulæ and stars, the space which separates us from our satellite is quite insignificant; she is our next-door neighbor and the eye can so clearly discern her form and peculiarities, that she seems almost to touch us. But this insignificant distance, abstractly considered, is yet vast enough. The distance from the earth to the moon is about 237,000 miles. If it were possible to get there by means of steam, it would require one year and about three hundred and twenty-two days for a locomotive starting from our globe and traveling at a high rate of speed to reach the moon and land its passengers; yet this is but a step compared to the distances of the stars.

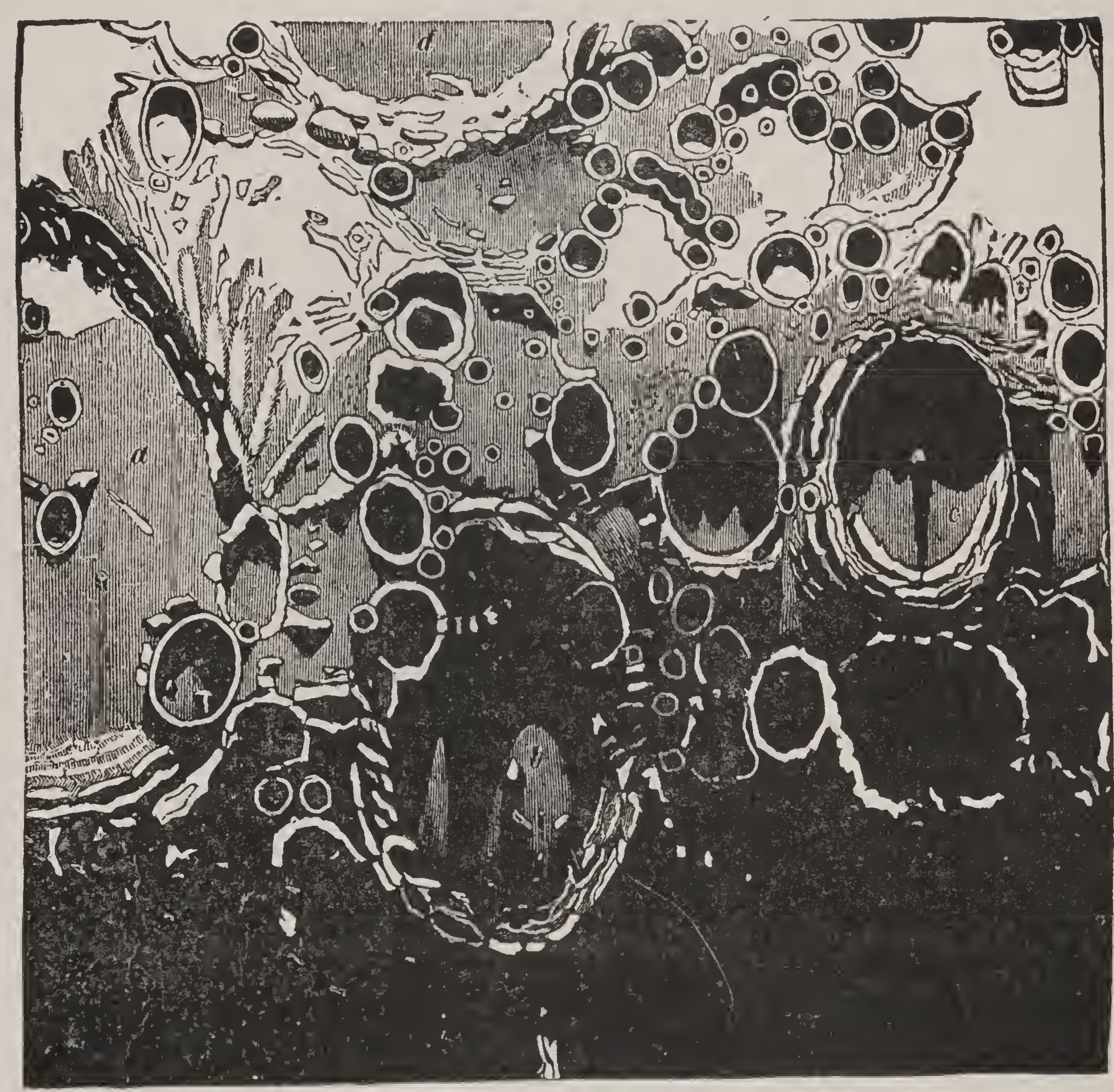
Grand Lunar Mountains.

The moon is in every part roughened with eminences of different shapes, but they only very rarely group themselves into mountain chains comparable to those of our globe. The Alps, Caucasus, and the Apennines represent the principal ones. Certain isolated summits have received the names of celebrated men, but those of past times have been chosen in order not to excite any jealousy; we travel from the Mountain of Aristotle to that of Hipparchus, from that of Ptolemy to that of Copernicus. The astronomers have very properly not forgotten their claims.

The highest lunar mountains attain an altitude which surpasses most terrestrial elevations, a fact which may well astonish us. Generally they do not rise beyond 22,750 feet. But in proportion to the size of the planet, we may say that the mountains in the moon are much loftier than those of the earth. The summits of Mount Dœrfel are

4,700 feet above the valleys which environ , whilst the crest of Mont Blanc only rises 5,632 feet above the level of the sea.

Most of the mountains of our pale companion are of volcanic origin, and its surface as been so shattered by subterranean fires hat in many places the craters are heaped p close beside each other. Probably no tar was ever so horribly torn by the fury of olcanoes. These ven attain proportions far beyond what s seen in our globe. ome of those lunar raters are four or five eagues in diameter, nd the gaping mouth f the volcano of ristillus, still more rodigious, is ten eagues from one idge to the other! ur glasses enable s to see these exinct craters in such roportions, that none f their details escape s: whilst, were we n the moon, our elescopes, according o Humboldt, would carcely enable us to make out terrestrial volcanoes.



VOLCANIC CRATERS ON THE MOON'S SURFACE AT SUNSET.

It seems strange to say that the geography of the moon, or at least of much of that portion of her surface which is presented to our view, is better known than that of many parts of our own earth; and yet this is quite true. Our telescopes are of such power that if there were an object on the moon's surface as large as the Capitol at Washington, they would surely reveal it to us.

Seen from the earth many lunar volcanoes appear very much depressed, and the edges of their craters resemble so many flattened rings, projecting very little above the plains. Some regions are so riddled with them that their mouths touch. Others surmount lofty summits, and their crenelated ramparts surround enormous excavations, which pierce deep into the mountains below.

Formerly the dark patches which cover part of the moon's surface were considered as representing lunar seas, but at present men are disposed to look upon them as only immense plains. The first astronomers gave them names full of poetry. There was the Sea of Tranquility, the Sea of Clouds, the Sea of Nectar, the Ocean of Tempests, and the Sea of Serenity.

The rocky and shattered soil of our satellite is perfectly bare; not a blade of grass grows there, not a flower opens. Totally deprived of water and air, life is an impossibility. A threefold death would overtake the least animal that happened to alight there; a squirrel would perish of hunger, thirst, and asphyxia! In these cold and horrid realms of the moon, everything is plunged in torpor and silence; the echoes are mute, and the breath of a zephyr never plays around the summits of the rugged mountains.

A Desert World.

By means of our instruments, which have now been brought to so great perfection, we can pry into the minutest details of our satellite, and examine them with as much accuracy as if it were some distant view on earth; hence we can, to a certain extent, make out its geological disposition. The precision of our glasses has been carried to such a pitch, that we could with them easily perceive large buildings, if any existed on the lunar surface; we could even make out troops of animals moving about. It would, it is true, be impossible to perceive one of its inhabitants traversing the valleys of its silver crescent, but if the much spoken of Selenites existed, we should certainly perceive their movements when they were collected into dense masses. According to Humboldt, however, there is only a noiseless, silent desert there.

Sir Walter Scott gives us, in one of his fine poetical outbursts, this apostrophe to the lunar world:

> Hail to thy cold and clouded beam,
> Pale pilgrim of the troubled sky!
> Hail, though the mists that o'er thee stream
> Lend to thy brow their sullen dye!
> How should thy pure and peaceful eye
> Untroubled view our scenes below?
> Or how a tearless beam supply,
> To light a world of war and woe?

There is a great contrast, not only app rent but real, between the serene tranquili of the lunar disk and the great movemen which are ceaselessly carried on on the su face of our world. On approaching tl moon nothing is seen of the physical caus which make the earth a vast laborato wherein a thousand elements contend unite with each other.

There are none of those tumultuous ten pests which sometimes sweep over o undulated plains; none of those hurrican which descend in waterspouts to be swa lowed up in the depth of the sea; no win blows, no cloud rises to the heavens. The white trains of cloudy vapors are not see nor those laden masses with heavy cohorts the rain never falls, and neither snow, n hail, nor any of the meteorological ph nomena are manifested there.

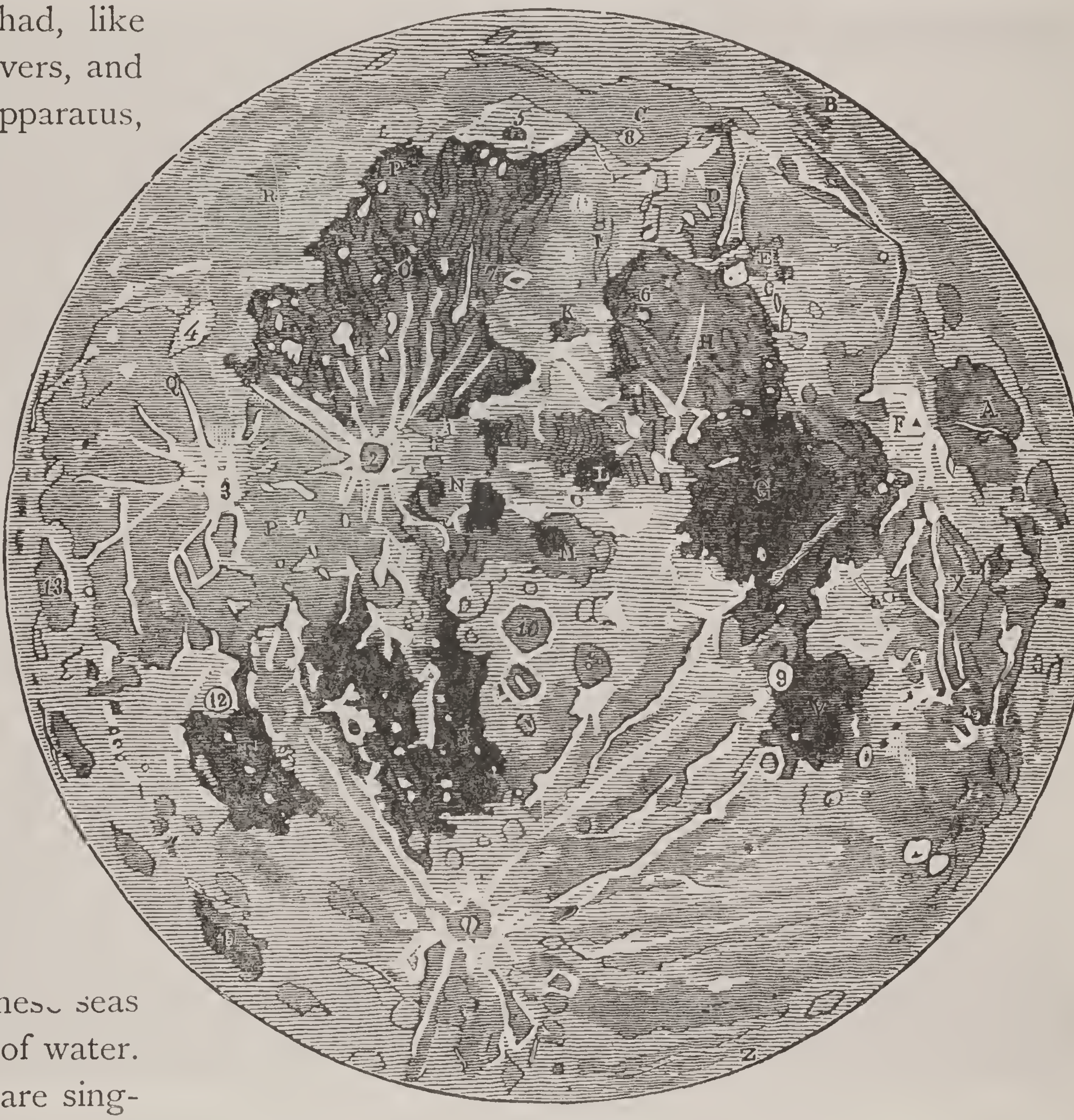
Silence and Death.

But, on the other hand, the magnificen tints which color our sky at sunrise and tw light, the radiation of the heated atmos phere, are never seen there; if winds an tempests never blow, neither is there th balmy breeze which descends upon ou coasts. In this kingdom of sovereign immobility, the lightest zephyr never comes t caress the hilltops; the sky remains eternally asleep in a calm incomparably mor complete than that of our hottest days whe not a leaf moves in the air. This is becaus on the surface of this strange world there is no atmosphere. From this privation results a state of things difficult to realize.

In the first place, the absence of air implies also the absence of water and every liquid, for water and liquids can only exist under atmospheric pressure: if this pressure is taken away they evaporate and their beds are dried up. Thus, for instance, if you place a vessel filled with water under the receiver of an air-pump, and then, by pumping out the air which is in the receiver, you make a vacuum, you will soon see the water boil, even when the place where the experiment is made is frozen with the most intense cold. The boiling disengages vapors, and, finally, the water is evaporated. Now let us suppose, that, at a certain period of its past existence the moon had, like the earth, seas and rivers, and that by the aid of any apparatus, its seas and rivers were made to boil and to fall into vapor again; by continuing this operation long enough the moon would be made completely dry: this is precisely what has happened.

Since the distant period of its formation in a fluid state, it has lost all its liquids and vapors, and now a linnet would die of thirst in the midst of the seas of the moon. These seas do not contain a drop of water. These, it will be said, are singular seas. And, indeed, no one will hold that their title is logical. But we have seen that they were named at a time when people did not know the lunar surface sufficiently well to guess that it existed without air and water.

From the absence of air follows another very curious fact—the absence of sky. An immensity without depth is traversed by the sight, and in the day as in the night are seen the stars, planets, comets, and all the bodies of our universe. The sun passes among them without extinguishing them, as it does to us. Not only does the moon not possess this perpetual diversity which the movements of the air produce on our world, but it has not the azure vault which covers the earth with such a magnificent dome; space is a black and a perpetually black abyss.



TELESCOPIC VIEW OF THE MOON.

Whilst on high there reigns darkness, below there is silence. Not the least sound is ever heard; the sigh of the wind in the woods, the rustling of foliage, the song of the morning lark, or the sweet warbling of the nightingale never awakens the eternally dumb echoes of this world. No voice, no speech has ever disturbed the intense solitude with which it is overspread. Unchangeable silence reigns there in sovereignty. Tall perpendicular mountains divide its surface. Here and there are seen worn out craters rising towards the sky, white rocks heaped up like the ruins of some long-passed revolution, crevasses crossing the surface as in lands dried by the burning rays of long summer days.

PART OF THE MOON'S CRESCENT DURING THE FIRST QUARTER.

That which renders the spectacle more strange is that the absence of vapors causes the absence of perspective as well as the absence of all tints, and we see only white or black according as the object is in the sun's light or in shadow, the objects succeeding each other as far as the horizon without losing brightness or contour. The moon is such a singular world that its mountains may be measured as well by depth as height. This paradox, rather difficult t understand, arises from the fact that th mountains of the moon are not like those c the earth, but are hollow. When we arriv at the top there is a ring, the white, rugge and sterile mountains, and lofty and deserte craters.

These solitary and dried-up landscape remind us of what Fontenelle said regardin the changes at work on the surface of our satellite, caused, not by the movements of life, like those which regulate terrestrial nature, but by the simple falling down of lands. "Everything is in perpetual motion," he says. "Even including a certain young lady, who was seen in the moon with a telescope about forty years ago, everything has considerably aged. She had a pretty good face, but her cheeks are now sunken, her nose s lengthened, her forehead and chin are now prominent to such an extent, that all her charms have vanished, and I fear for her days."

"What are you relating to me now?" interrupted the Marchioness.

"This is no jest," returned the author. 'Astronomers perceived in the moon a particular figure which had the aspect of a woman's head, which came forth from between the rocks, and then occurred some changes in this region. Some pieces of mountain fell, and disclosed three points which could only serve to compose a forehead, a nose, and an old woman's chin."

Gleaming Mountain Crests.

We do not know whether the face, of which the ingenious writer speaks, existed anywhere but in his imagination; but changes, even caused by simple fallings, are extremely rare, if even they are still produced. For a hundred years, for instance, during which period a day has not elapsed in which the moon has been visible, without it being observed by the telescope, the slightest movement has never been noticed.

At the commencement of the century, it is true, people fancied they observed active volcanoes, but they have since discovered that very probably what were then taken for volcanoes were nothing more than the white crests of certain mountains, their form or their structure being more favorably adapted to reflect light. Thus the orb of night remains dumb and silent. Why this sad and solitary fate? This is the question asked by the poet Shelley:

> Art thou pale for weariness,
> Of climbing heaven and gazing on the earth,
> Wandering companionless
> Among the stars that have a different birth,
> And ever changing, like a joyless eye
> That finds no object worth its constancy.

Now that we have pointed out how the moon is an inhospitable world, poor and destitute of nature's gifts, it is necessary to retrace our steps, and show it to you as a magnificent world, worthy of admiration and esteem. We do not wish to contradict the foregoing words; but in order not to leave a bad impression with regard to our faithful friend, we wish to remind you that nature, even when it appears to disgrace some of its works from some points of view, favors them with very desirable riches when regarded under other aspects.

A Magnificent Spectacle.

To an astronomer, the moon would be a magnificent observatory. In the daytime he could observe the stars at noon, and thus discover, without trouble, that they reside eternally in the heavens. With us, on the contrary, among the ancients, were a great number who imagined that they were lighted up in the evening and extinguished in the morning. If, then, people make astronomical observations on the moon, the sun is not a tyrant who governs the heavens absolutely; it allows the stars to be enthroned peaceably with it in space; and studies commenced during the night can be carried on without difficulty during the day until the following night.

On our satellite the nights are fifteen times twenty-four hours long, and the days are of the same length; but there is an essential difference to remark between the nights of the lunar hemisphere, which faces us, and those of the hemisphere which we do not see.

You must have noticed that the moon always presents the same side to us. From the beginning of the world it has never shown but this side. We read in Plutarch, who wrote nearly two thousand years ago, a thousand conjectures relative to the side of the moon always turned toward us. Some said it was a large mirror, well polished and excellent, which sent back from afar the image of the earth; the dark portions represented the oceans and seas, while the bright portions represented the continents.

Others believed that the spots were forests, where some placed the hunts of Diana, and that the most brilliant parts were the plains. Others, again, saw in it a very light, celestial earth; they stated that its inhabitants must pity the earth which is below them, and which is only a mass of mud. Others, again, and their singular opinion was widely spread, added that the beings who peopled it were fifteen times larger than those of our earth, and by the side of the lunar trees our oaks would only be small bushes. All this to explain the nature of the lunar face eternally turned towards us.

THE EARTH AS SEEN FROM THE MOON.

Now, if we never see but one side of the moon, it follows that there is only one side of this body which sees us; so that half the moon has a moon—namely, our eartl and the other half is deprived of one. there are any inhabitants on the hemispher turned from us, they do not guess that th moon is only a body placed for illuminatio of our nights, and they must be greatl astonished when the narratives of traveler relate to them the existence of our eartl in the heavens. If the travelers there resemble those here, what tales must the spread with regard t us? But, also, how useful must the earth be t the lunar nights, an how beautiful we are— from afar!

Silvery Splendors.

Fancy to yoursel fourteen moons like tha which gives us light, o more properly speaking, a moon with fourtee times the extent of surface, and you will have an idea of the earth as seen from the moon. Sometimes it only presents a fringed crescent, a few days after the new earth; sometimes it presents the first quarter; sometimes it shines out with its full disk, spreading its silvered light in floods. The most fortunate thing is, that it begins to shine precisely in the evening, that its brightest light, its full disk, is precisely at midnight, and that it fades away in the morning at the time when it is no longer required. And it is known that from the evening to the morning is fifteen times twenty-four hours with our neighbors the Selenites.

How much more reasonable are these

abitants than we are in believing that the oon was created and placed in the world pressly for them, and that we are only eir very humble servants !

The lunar caverns form a very peculiar d prominent feature of the moon's surface, d are to be seen in almost every region, t are most numerous in the southwest rt of the moon. Nearly a hundred of em, great and small, may be distinguished that quarter. They are nearly of a cirlar shape, and appear like a very shallow gg cup. The smaller cavities appear within most like a hallow cone, with the sides pering towards the centre ; but the larger nes have, for the most part, flat bottoms, om the centre of which there frequently ses a smal lconical hill, which gives them resemblance to ridges and mountains.

SINGULAR ASPECT OF THE MOON'S SURFACE.

In some instances their margins are level with the general surface of the moon ; but in most cases they are encircled with a high ridge of mountains marked with lofty peaks. Some of the larger of these cavities contain smaller cavities of the same kind and form, particularly in their sides. The mountainous ridges which surround these cavities reflect the greatest quantity of light; and hence that region of the moon in which they abound appears brighter than any other.

From their lying in every possible direction, they appear, at and near the time of full moon, like a number of brilliant streaks or radiations. These radiations appear to converge towards a large brilliant spot surrounded by a faint shade, near the lower part of the moon, which is known by the name of Tycho, and which every one who views the full moon even with a common telescope, may easily distinguish.

In regard to their dimensions, they are of all sizes, from three miles to fifty miles in diameter at the top; and their depth below the general level of the lunar surface varies from one-third of a mile to three miles and a half. Twelve of these cavities, as measured by Schroeter, were found to be above two miles in perpendicular depth. These cavities constitute a peculiar feature in the scenery of the moon, and in her physical constitution, which bears scarcely any analogy to what we observe in the physical arrangements of our globe.

A Remarkable Crater.

It is a curious fact that the surface of the lunar hemisphere was known before that of our own earth, and the heights of all its mountains were measured before the same thing was done for our own. The volcano of Aristillus in particular was one of the first and best known. Lecouturier, the author of a very good map of the moon, gave a long description of it, and this description may be applied to the most of the lunar mountains. It is composed of a crater about twenty-four miles across, from the centre of which rise two cones, the highest of which attains nearly 984 yards; the whole is surrounded by a circular rampart.

When the bottom of the crater is examined with a powerful telescope, and under favorable circumstances, numerous rough portions are noticed which seem to indicate hardened lava and blocks of rock heaped together. From this mountain, taken as a centre, start five or six lines and rocky ramifications directed towards the east and south. These ramifications give rise to the radiation of Aristillus. They are surmounted by an enormous quantity of peaks or basaltic columns which rise from their summits, make them resemble from afar the multit of bell towers that are seen on some Got cathedrals. Aristillus presents the gene aspect of most of the mountains of our sat lite.

Thus the moon would appear very inh pitable to us. The sense of speech, like sense of hearing, would be lost, and, con quently, would not exist. To the privat of these two senses, perhaps, must be add an inferiority in the pleasures which sig gives to us, seeing that wherever the e would be directed, it would only meet w a scene of comparative desolation.

It is doubtless this proximity which h caused the great reputation of the lunar o amongst us. No celestial body, except t sun, has ever had a similar influence. T whole world, it was supposed, was accessib to the lunar influences, men, animals, plan minerals. The astrological opinions wi regard to this body were most singula We must quote some; they are really to curious to be passed over in silence. Let choose one or two good astrologers, learne on the moon, and let us question them.

Curious Opinions.

Cornelius Agrippa, a famous geomance thus expresses himself: The moon is calle Phœbe, Diana, Lucinus, Proserpine, Hecat who governs the months, half-formed; wh illuminates the nights, wandering, in silenc with two horns; queen of divinities, quee of heaven, who rules over all the element to whom respond the stars, to whom retur the seasons, and whom the elements obey at whose direction the thunders sound, th seeds germinate, the germs increase; th primordial mother of fruits, heart of Phœbu shining and brilliant, carrying light from on planet to another, illuminating by her ligh all the divinities, stopping various intercourses with the stars, distributing the light rendered uncertain on account of meetings with the sun ; queen of beauty, mistress of hores and winds, giver of riches, nurse of nen, governor of all states good and unappy; protecting men by sea and land, noderating the reverses of fortune ; dispensng with destiny, nourishing all which comes ut of the earth, arresting the insults of hantoms, holding the cloisters of the earth losed, the heights of heaven luminous, the urrents of the sea salutary, and ruling at ill the deplorable silence of the lower egions, governing the world, treading Tarrus under foot ; of whom the majesty auses the birds which fly in the sky, savage easts in the mountains, the serpents hidden under the earth, and the fish in the sea, to tremble.

According to Eteilla, the moon governs comedians, butchers, tallow and wax chandlers, ropemakers, lemonade-vendors, publicans, playwrights of all kinds, masters of great works, menageries of animals ; and, on the other hand, professional gamblers, spies, sharpers, cheats, bankrupts, false money-coiners, and mad-houses ; that is to say, the moon rules over all those whose business it is to work during the night until sun-rising, or to sell provisions for the night ; and it also rules over all which people would be ashamed to commit in full day, in sight of those who have manners. Thus each reader may easily find out what denomination he is and what it is that governs him.

Amazing Distances

SPACE has neither beginning nor end. The heavens are infinite space, indefinite expanse, a void without limits ; no frontier circumscribes them, they have neither beginning nor end, neither top nor bottom, right or left ; there is an infinity of aces which succeed each other in every ection. The earth is a little material obe, placed in this space without support any kind, like a bullet which sustains itself ne in the air, like the little captive balloons ich rise and float in the atmosphere when the thin cord which retains them is broken.

A multitude of suns, surrounded like ours with a family of which they are the foci and the light-givers, float likewise in all parts of the expanse. These suns are the stars with which the fields of heaven are scattered. In spite of the appearance caused by perspective, immense spaces separate all these systems from ours, spaces so great that the highest figures of our great numeration can scarcely number the smallest amongst them. A distance that our figures can scarcely express also separates these stars from each other, extending from depths unto depths.

Notwithstanding these prodigious intervals, these suns are in number so considerable that their numeration as yet exceeds all our means; millions joined to millions are inadequate to enumerate the multitude! Let the mind try, if it is possible, to represent to itself at one time this considerable number of systems and the distances which separate them one from the other! Confused and soon humbled at the aspect of this infinite richness, it will only learn to admire in silence this indescribable wonder.

Heavens Piled on Heavens.

Continually rising on the other side of the heavens, going beyond the distant shores of this ocean without limits, it will endlessly discover fresh new space, and new worlds will reveal themselves to our eager gaze, heavens will succeed to heavens, spheres to spheres; after deserts of expanse will open other deserts, after immensities other immensities; and even when carried away without rest, during centuries, with the rapidity of thought, the soul would continue its flight beyond the most inaccessible limits that imagination could conceive,—there even the infinite of an unexplored expanse would remain still open before it; the infinite of space would oppose itself to the infinite of time; endlessly rivalling, without our ever being able to take away from the other: and the spirit will be arrested, overcome with fatigue, at the entrance of infinite creation as if it had not advanced a single step in space.

Ye stars! bright legions that, before all time,
Camped on yon plain of sapphire, what shall tell
Your burning myriads but the eye of Him
Who bade through heaven your golden chariots
wheel?
Yet who, earth-born, can see your hosts, nor feel
Immortal impulses—eternity?
What wonder if the o'erwrought soul should reel
With its own weight of thought, and the wild eye
See fate within your tracks of deepest glory lie?

The immensity of the heavens has bee sung on many lyres; but how can the son of man express such a reality? Poets hav tried to render it in verse, when one feels th insufficiency of speech to note the immens thoughts which this wonderful contemplatio develops in us.

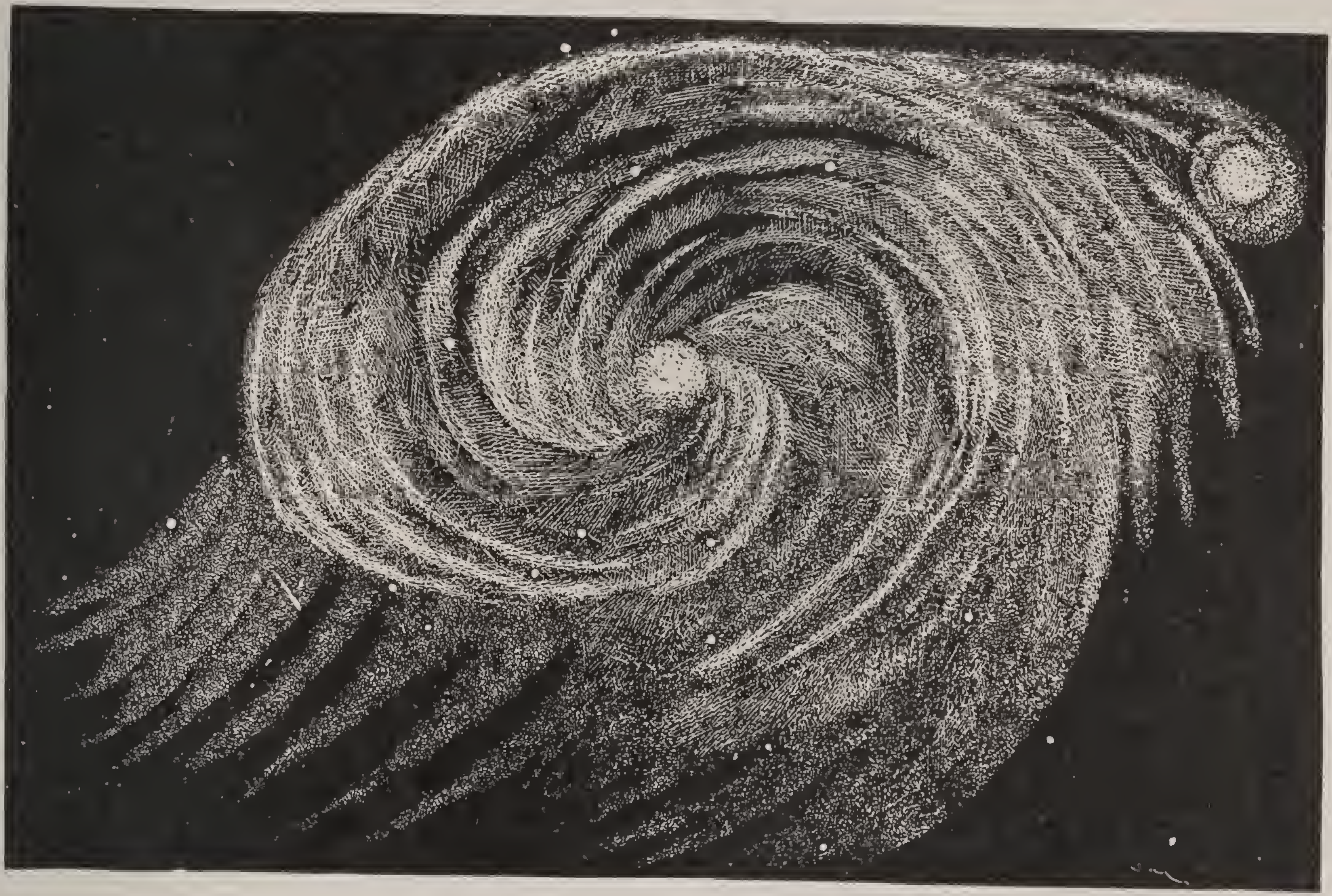
Marvelous Flight Through Space.

We wish to open space before us and employ ourselves there, in trying to penetrat its depth. The velocity of a cannon-ba from the mouth of the cannon makes swi way, 437 yards per second. But this woul be too slow for our journey through spac as our velocity would scarcely be 900 mil an hour. In nature there are movements in comparably more rapid, for instance, th velocity of light. This velocity is 186,00 miles per second. We will place ourselv on a ray of light and be carried away on i rapid course.

Taking the earth as our starting-point, w will go in a straight line to any point of th heavens. We start, and at the end of th first second, we have already traversed 18 000 miles; at the end of the second, 372,00 We continue: ten seconds, a minute, te minutes have elapsed—111,600,000 mil have been passed. Flying away during a hour, a day, a week, without ever slackeni our pace—during whole months, and even year, the time which we have traversed already so long that expressed in miles, t numbers exceed our faculty of comprehe sion, and indicate nothing to our min they would be trillions, and millions of m lions.

But we will not interrupt our flig Carried on without stopping by this sa rapidity of 186,000 miles each second, let penetrate the expanse in a straight line f whole years, fifty years, even a centuryvhere are we? For a long time we have one beyond the last starry regions which re seen from the earth, the last that the elescope has visited; for a long time we ravel in other regions, unknown and unxplored. No mind is capable of following he road passed over; thousands of millions oined to thousands of millions express nothng: at the sight of this prodigious expanse ne imagination is arrested, humbled.

Well! this is the wonderful point of the oblem: we have not advanced a single ep in space. We are no nearer a limit than we had remained in the same place; we ould be able again to begin the same ourse, starting from the point where we are, nd add to our voyage a voyage of the same tent; we should be able to join centuries centuries in the same itinerary, with the me velocity,—to continue the voyage witht end and without rest; we should be able guide ourselves in any part of space, left, ght, forwards, backwards, above, below, in every direction; and when after centuries employed in this giddy course, we should stop ourselves, fascinated or in despair before the immensity eternally open, eternally renewed, we should again understand that our flights had not measured for us the smallest part of space, and that we were not more advanced than at our starting point. In truth, it is the infinite which surrounds us, as we before expressed it, or the infinite number of worlds. We should be able to float for eternity without ever finding anything before us but an eternally open infinite.



CYCLONE OF SPIRAL NEBULA.

In the bosom of infinite space, the unfathomable extent of which we have tried to comprehend, float rich clusters of stars, each separated by immense intervals. These rich groupings of stars have received the name of nebulæ. This name was given at the time of the invention of astronomical lenses, when these starry tribes were distinguished only under a diffused, cloudy aspect, which did not enable the eye to distinguish the composing stars. This appearance not revealing in any way the idea of solar clusters, it was thought that they were only phosphorescent vapors, whirlwinds of luminous substance, or possibly primitive fluids, whose progressive condensation would in the future effect the formation of new stars. The first nebula observed by the aid of the telescope and pointed out as an object of particular nature, the nebula of Andromeda, was considered for three centuries and a half as entirely deprived of stars.

Infinite Clusters of Stars.

Only a few years ago a Cambridge astronomer counted within the limits of this nebula 1500 little stars, notwithstanding which, the centre still keeps the aspect of a diffused light, in spite of the best instruments. Later, the astronomer Halley thought no more of the star-clusters.

Thus, infinite space must be represented as an immense void in the bosom of which are suspended archipelagoes of stars. These archipelagoes are themselves of infinite number; the stars which compose them can be counted by millions, and from one to the other the distance is incalculable. They are distributed in space in every direction, following every imaginable course, and invested with every possible form.

The fixed stars are in reality suns, many of them thousands of times larger than our little sun.

The existence of binary stars was discovered by Sir William Herschel toward the close of last century. It had long been noticed by astronomers as a remarkable coincidence that, in several instances, a pair of bright stars were found in close proximity to each other, much closer than we should have expected, supposing the stars to have been scattered up equally distant from all its four suns. A green and a red sun ar above the horizon, and when we look directl at either, its color is clear, brilliant and wel defined. But their rays meet and mingl and unite into a dazzling snowy white, whic imparts to the whole landscape the pur radiant look which seems to fill the firma ment on a sunny day when the ground covered with snow. A light cloud-wreat steals over the green sun, and a faint ros blush overspreads the face of the sky. Th cloud thickens, and the rosy hue deeper into a mellow crimson.

Then the green sun sets and a blue on rises, changing the red light of the sky int a rich purple, veined here and there with pa amethyst, as a few rays from the green su struggle through the clouds just as it sink beneath the horizon. The purple change into a deep gold as the blue sun is succeede by an orange one, and the gold pales dow as the red sun sinks to his rest in turn. Th orange is left alone, and when it, too, set night comes on apace.

All the Colors of the Rainbow.

And now the moons rise and shed the radiance on the scene. But how different do they show from the pale uniform lig that beams from our own plain satellite Every color of the rainbow glows from the faces; in belts, in spots, in lunes, the checkered disks reflect every shade of h that the artist's palette can produce.

The parts illumined by one sun alo reflect, more faintly than the rest, the colo of their respective orbs; those which con within the light of two or three of them w shine more brightly and with gayer con binations of colors; while in the parts which all the four suns shine at once we fi again the snowy white, so bright as to spark almost with the light of day.

But where there are four great lights to rule the day, night will be of unfrequent occurrence and of short duration; and soon the four suns, their noctural course ended, begin at once to draw nigh to their rising. Pale, slender threads of red, green, blue, and orange steal out from the darkness in four quarters of the horizon; and these widen and lengthen till they mingle together at their extremities in softly shading hues of white, indigo, and gold. Brighter and broader they grow, and the gorgeous variegated belt spreads rapidly from horizon to zenith, till at last the suns have fairly risen, and their many-colored rays combine again into the dazzling white of the perfect day.

Magnificent Constellations

REPRESENTATIVE maps were formed of the heavens by the ancients, and from the time of Hipparchus, the Greek astronomer, they were able to class the stars, distingushing them according to their brightness. The bright clusters are called constellations, and the ancient astronomers gave them, for the most part, the names of animals according to heir supposed resemblance to some representative of the animal kingdom.

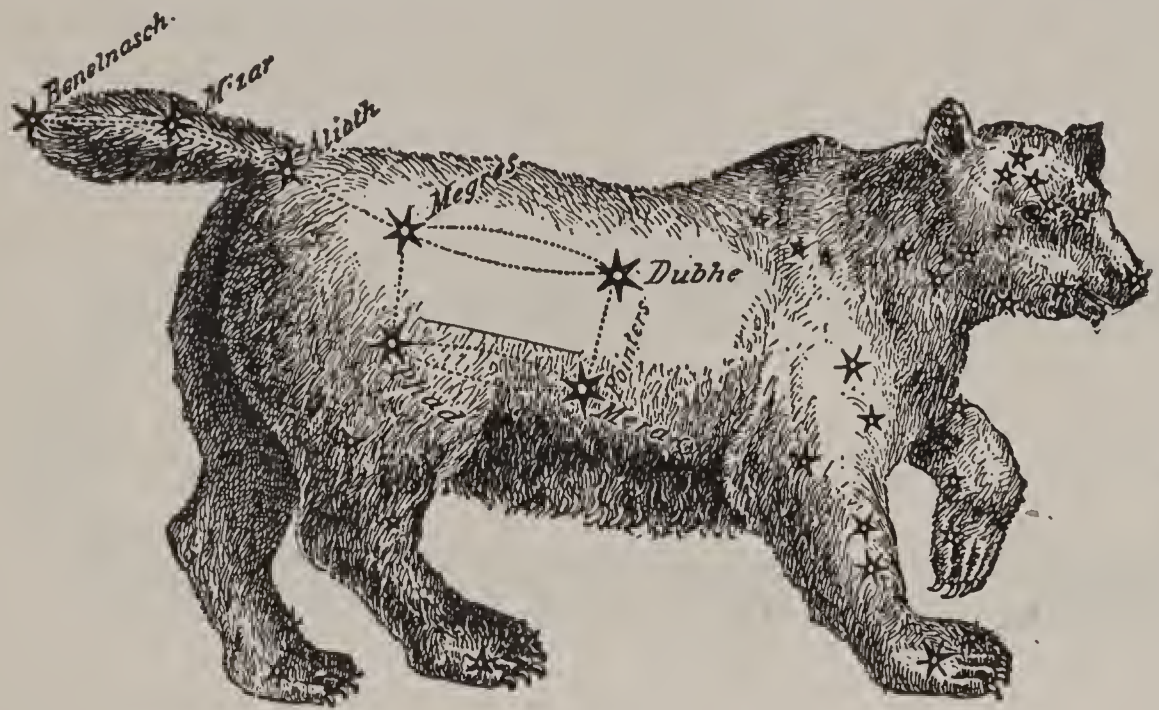
Let us form the geography of the heavens. The innumerable figures of animals, men or objects, with which the sphere is adorned, will not all be drawn here, seeing that they would only serve to confuse the mind with maginary lines. Formerly they printed elestial atlases, where the figures were epresented with exquisite care, so much so, ndeed, that they ended by forgetting the tars, and the sky was nothing more than a menagerie. In spite of the interest of the mages, we will not follow this example. At present, let us see how to direct our course for reading correctly the great book of the heavens.

THE GREAT BEAR.

There is one constellation known to everyone; for greater simplicity we will begin with it, as it will serve as a starting-point to go towards the others, and as a sign to find its companions. This constellation is the Great Bear, which has also been called David's Chariot, or Charles's Wain; which the ancients called *Septem triones* (whence came the word *septentrion*), or, again, *Helix*, *Plaustrum;* which the Greeks addressed under the name of *Arktos Megale;* which the Arabs called *Aldebb al Akbar*, and the Chinese, three thousand years ago, addressed as the *Tcheou-pey*, the god of the north. Thus it can boast of a high celebrity.

If, however, in spite of its universal notoriety, some have not yet had occasion to make its acquaintance, the following is the sign by which it may always be recognized.

Turn towards the north, that is to say, opposite the spot where the sun is at noon. Whatever may be the season of the year, the day of the month, or hour of the night, you will always see there a large constellation formed of seven stars, four of which are quadrilateral, and at a right angle with the side.

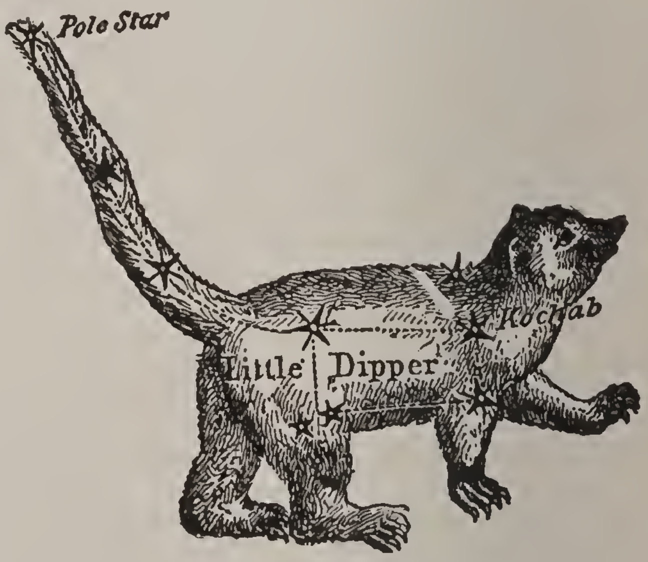


URSA MAJOR, OR GREAT BEAR.

Have you not all seen it? It never sets. Night and day it watches above the northern horizon, turning slowly in four-and-twenty hours around a star of which we shall speak presently. In the figure of the Great Bear, the three stars of the extremity form the tail, and the quadrilateral forms the body. In the Chariot the four stars form the wheels, and the three the car. Above the second between these latter, good sights distinguish a very small star called Alcor, which is also called the Cavalier. The Arabs used it to test a good eye.

This constellation is also called the Big Dipper, from its supposed resemblance to a dipper. If a straight line be carried through the two stars on the side opposite the handle, a star less brilliant than the preceding ones is found, which forms the extremity of a figure like the Great Bear, but smaller and directed in a contrary direction. This is the Little Bear, or Little Chariot, also formed seven stars. The star to which our lir brings us, that which is at the extremity the Bear's tail, or at the end of the shaft the Chariot, is the Pole-Star. Always foun in its place, it is an example of fidelity.

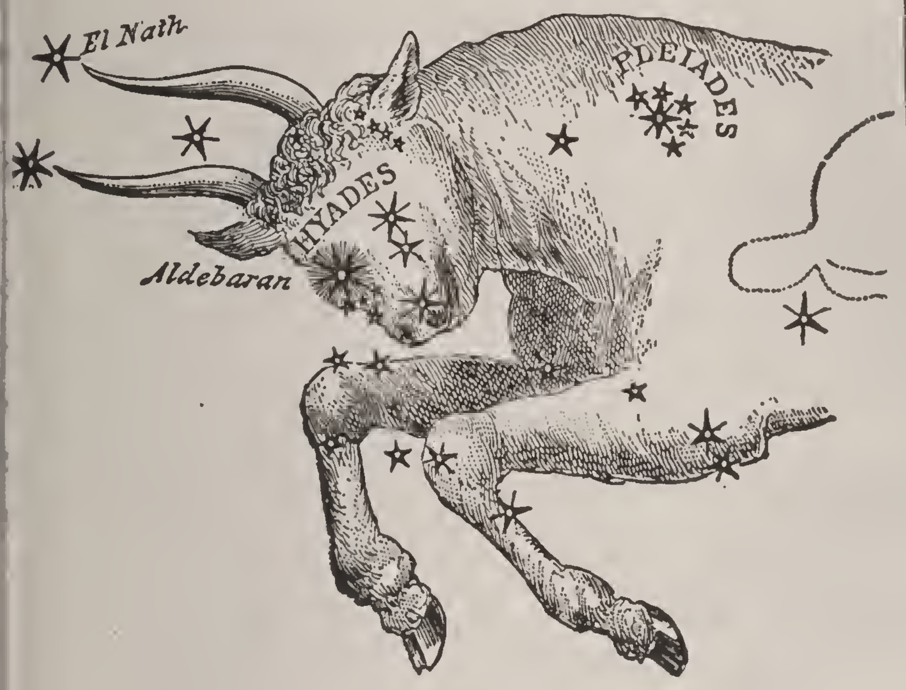
The Pole-Star has a certai renown, like all personages wh distinguish themselves fro others, because, among all th stars which twinkle in our starr nights, it remains immovable i the heavens. At any momer of the year, day or night, if yo observe the sky, you will a ways find it occupying the sam place. All the other stars, o the contrary, revolve round every twenty-four hours, a hol for the centre of this immens whirlpool! The Pole-Star remains immov able over one pole of the world, whence it used as a fixed point by navigators of th pathless ocean, as well as by travelers in a unexplored desert.



URSA MINOR.

CASSIOPEIA.

Looking at the Pole-Star, stationary in th midst of the northern region, we have th south behind us, the east to the right, th west to the left. All the stars revolvin around the Pole-Star, from right to lef ought to be recognized according to their mutual relations rather than according to the cardinal points. On the other side of the Pole-Star, relating to the Great Bear, is another constellation easily recognized. This s Cassiopeia, which is formed of five stars of he third magnitude, arranged somewhat like he slanting strokes of the letter M. This group takes every possible position, going round the pole; sometimes being above, sometimes below, sometimes to the left and sometimes to the right; but it is always easy o find, seeing that, like the preceding constellation, it never sets and is always opposite to the Great Bear. The Pole-Star is the axle around which these two constellations revolve.



TAURUS OR BULL.

We go from west to east. We shall easily recognize the Bull by the group of the Pleiades which sparkle on its shoulder, by that of the Hyades which glimmer on its forehead, and by the magnificent star which marks its right eye, the star Aldebaran, of the first magnitude. It is, moreover, situated just above the splendid constellation of Orion.

The Pleiades, which are seen in the annexed engraving, are a group of about 80 stars, resolved by the telescope. The ancients counted in the Pleiades seven stars more brilliant than the ground sprinkled with golden dust. At the present time only six can be counted with the naked eye. Alcyone in Pleiades appears to be the central point of the universal heavens.

CASSIOPEIA.

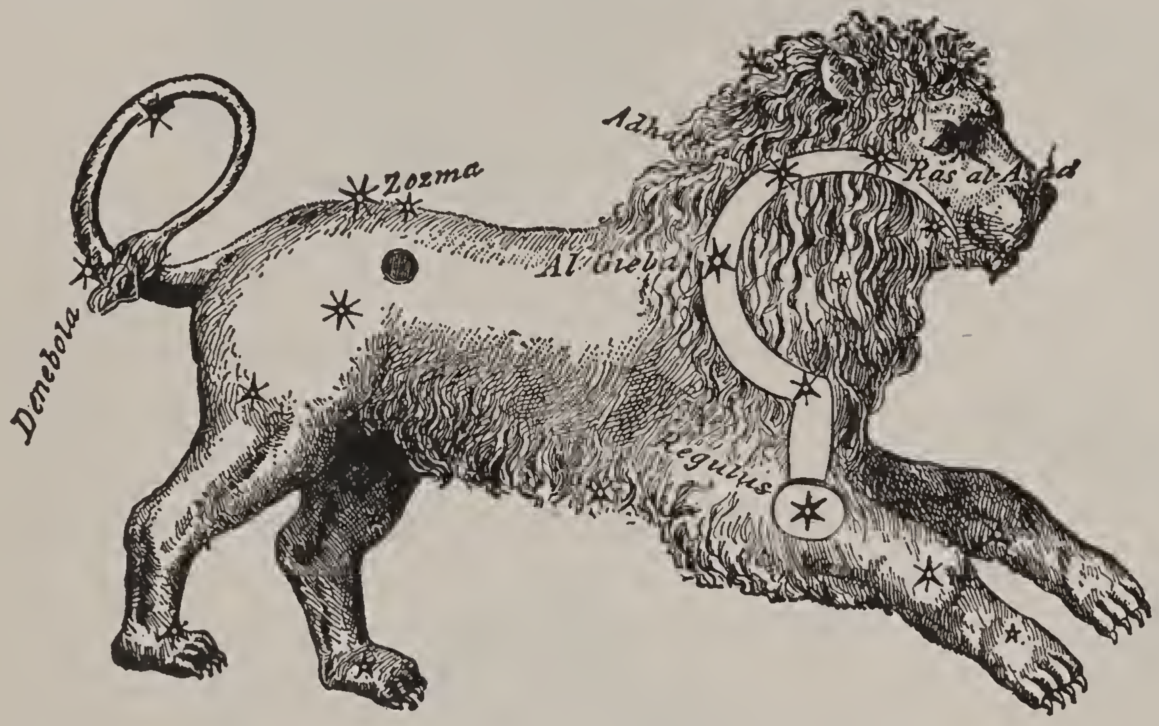
This region, marked with Orion, Sirius, the Twins, the Goat, Aldebaran and the Pleiades, is ths most magnificent region of the celestial sphere. It is towards the end of Autumn that it shines in our hemisphere in the evening. The Twins are, in the fable, Castor and Pollux, sons of Jupiter, celebrated for their indissoluble friendship, for which they were rewarded by immortality. The Greeks also gave the name of Castor and Pollux to those lights which appear round

THE TWINS.

vessels after storms, electrical phenomena now called the fires of Saint Elmo.

The Crab or Cancer may be distinguished at the bottom of the line of Castor and Pollux, in five stars of the fourth or fifth magnitude. It is the least important body of the zodiac. While Hercules was fighting the Lion of Nemea, the Crab, aiding the vengeance of Juno, pinched the heel of the hero, who crushed it with his foot, but the queen of heaven gave it its reward by placing it in the heavens.

The Lion is a cluster of beautiful stars, situated to the east of the Twins. The most brilliant of these stars is of the first magnitude, and is called Regulus, the heart of the Lion; the three others are of the second magnitude. The sun enters the Lion at the summer solstice, and causes it to disappear by covering it with his fires; this is the victory of Hercules over the Lion of Nemea. It was also for the same cause the symbol of strength and power. Being the abode of the sun during the month of July, it was again the sign of burning heats and of plagues which they sometimes brought with them. In the eyes of astrologers of the middle ages, this was its terrible aspect. The Virgin comes after the Lion.



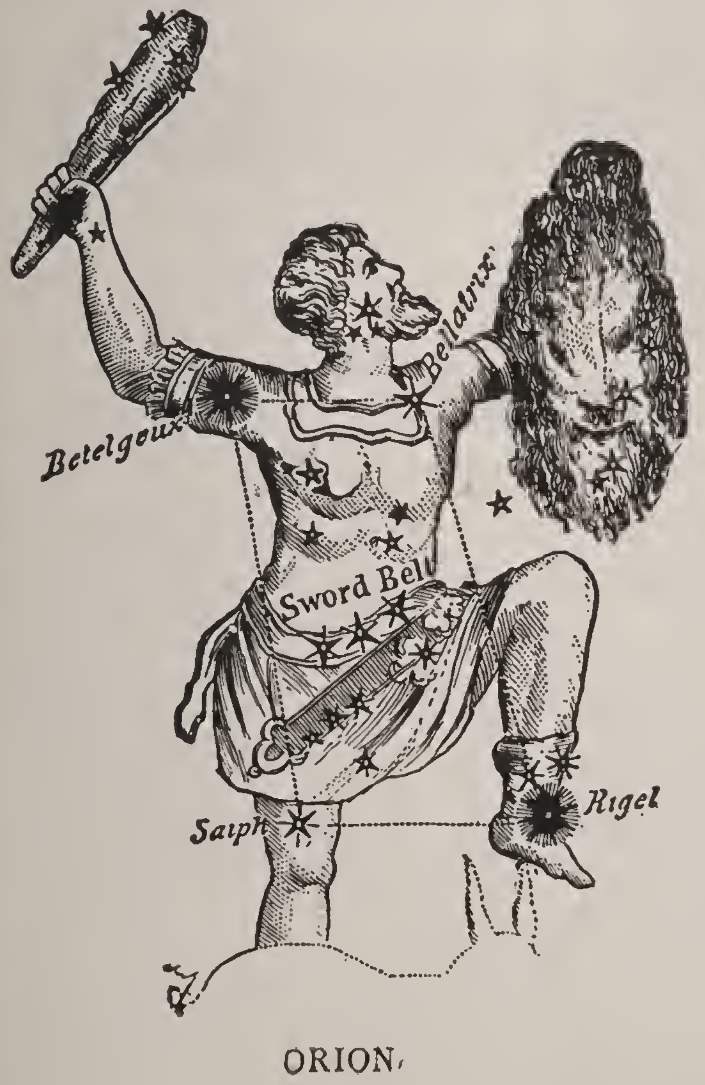
LEO, OR THE LION.

Copernicus (the He-goat) is not rich bright stars. Those which sparkle on h forehead, are the only ones which can l distinguished by the naked eye. In son authors Copernicus represents the goat Ama thea, which nursed Jupiter on Mount Id and received a place in heaven as a rewar According to others, it represents the retur of the sun to the winter solstice through th gates of the tropics. Again, according t others, it was a he-goat which was brough up with the king of the gods, and whic discovered and sounded the marine trumpe and produced fear among the Titans in thei war with Olympus. The fright ened gods hid themselves in th forms of different animals Apollo changed into a crane Mercury into an ibis, Diana int a cat. Such a metamorphos was never seen. Lastly, Pa nto Capricornus, having a goat' body and the tail of a fish. H appeared, also, to wish to stea away with the giants who scale heaven.

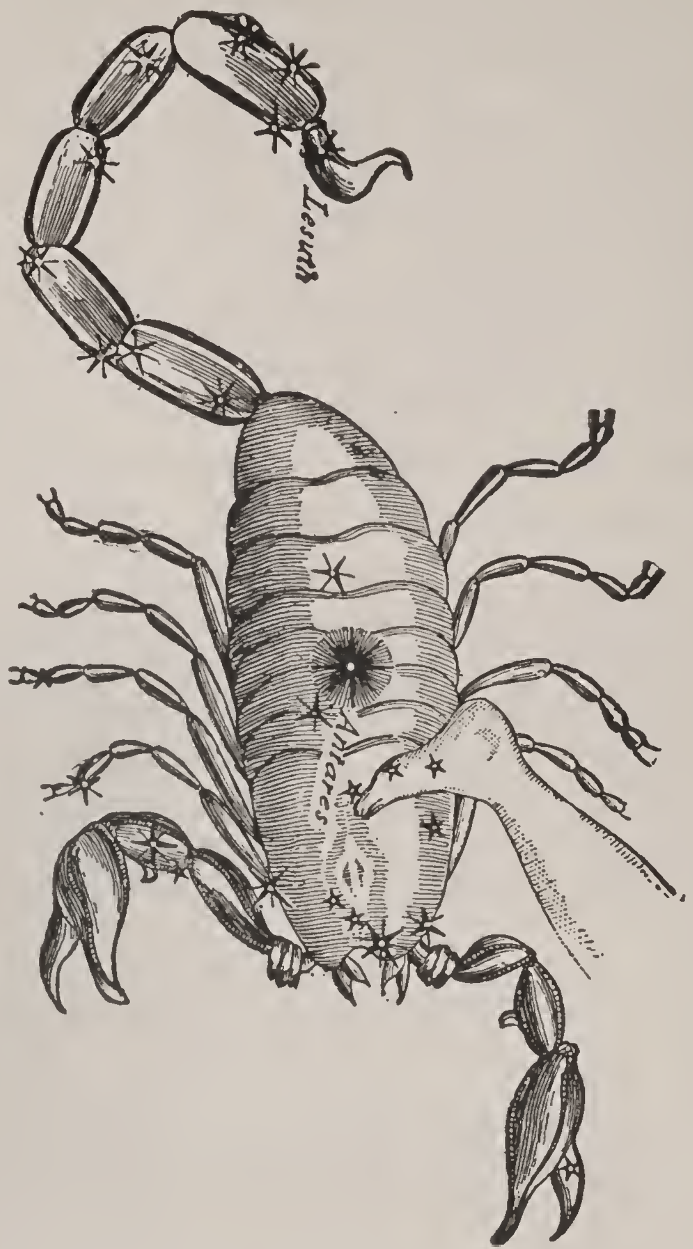
Aquarius forms with his three tertiary stars a very obtuse triangle. The base is prolonged in a string o stars from the side of Capricornus, and towards the left to the Urn. Thence begins a sinuous line of very small stars descending to the horizon. This is the water poured out by Aquarius. Aquarius appears to personify Ganymede, who was raised by Jupiter's eagle to serve as cup-bearer to the gods after the downfall of Hebe.

The Scorpion, with its heart marked by the brilliant Antares, a star of the first magnitude, is easily recognized. It is not that the form can be distinguished; for this form is not better sketched out by the stars which compose it, than the preceding figures have een. But it is well understood that, when ve speak of recognizing a constellation, we efer simply to the groups of stars which ear its name and not to its mythological gure. The Scales and Scorpion only rmed one sign, with the Latins before ugustus : the Scales were then the claws f the Scorpion. As Augustus was born on e 23d of September, flattery leagued itself ith astrology to celebrate the happiness romised to the earth by the birth of this nperor ; the Scales, which the Egyptians d formerly instituted in the original sphere, ere replaced in the heavens as a symbol of stice.

The verses of the Eneid may now be easily terpreted. As a sign of misfortune and ar, the Scorpion was cursed among all the nstellations. It was said, especially, that had an invincible hatred towards Orion, cause this figure sets when the former ses, and *vice versa*. It was not only the rror of the stars, but also the terror of the n himself, that Ovid has described it to us.



ORION.



THE SCORPION.

ORION.

Among the southern constellations Orion is the most beautiful ; we must not pass it without doing homage to it. It is during fine winter nights that this constellation shines over our heads. No other season is so magnificently constellated as the winter months. Whilst nature deprives us of certain enjoyments on the one hand, it presents us with others no less precious. The wonders of the heavens present themselves to us from the Bull and Orion at the east, as far as the Virgin and Boötes at the west ; of eighteen stars of the first magnitude, which may be counted in the whole extent of the firmament, a dozen are visible at nine o'clock in the evening, not counting many beautiful stars of the second order and the remarkable nebulæ worthy of the attention of mortals.

Thus it is that nature establishes everywhere harmonious compensation and, whilst it darkens our short and frosty winter days, it gives us long nights enriched with the wealthiest creations of the heavens.

The constellation of Orion is not only the richest in bright stars, but it conceals also treasures for the initiated which no other can present. We might almost call it the California of the heavens. Let as speak first of its nebulæ, situated below the second star of the Belt.

This has been minutely examined and the different regions of its cluster have been studied and described in all their details. In proportion as the instruments have become more powerful, the stars, which constella it, appear more numerous, which has ha pened in all telescopic observations nebulæ; and, whilst in early days it w asked with great uncertainty if there w only a phosphorescent cloud, a vaporo mass—astronomers afterwards arrived at t conviction that it was formed of an immen number of heaped-up suns.

It occupies a large space in the sky, i apparent dimension being equal to that of t lunar disk. When we think of the distan which separates us from this agglomeratio we are dismayed at the real extent whic it embraces in the midst of the boundle void and limitless expanses of the sky.

Strange Wanderers in Space

COMETS are tailed bodies that suddenly come to light up the heavens, and were long regarded with terror, like so many warning signs of divine wrath. Men have always thought themselves much more important than they really are in the universal order; they have had the vanity to pretend that the whole creation was made for them, whilst in reality the whole creation does not suspect their existence. The earth we inhabit is only one of the smallest worlds; and therefore it c scarcely be for it alone that all the wonde of the heavens, of which the immense maj ity remains hidden from it, were created.

The word comet is derived from a Gre word signifying hair, a title which had i origin in the hairy appearance often exhibit by the haze of luminous vapor, the presen of which is, at first sight, the most striki characteristic of comets.

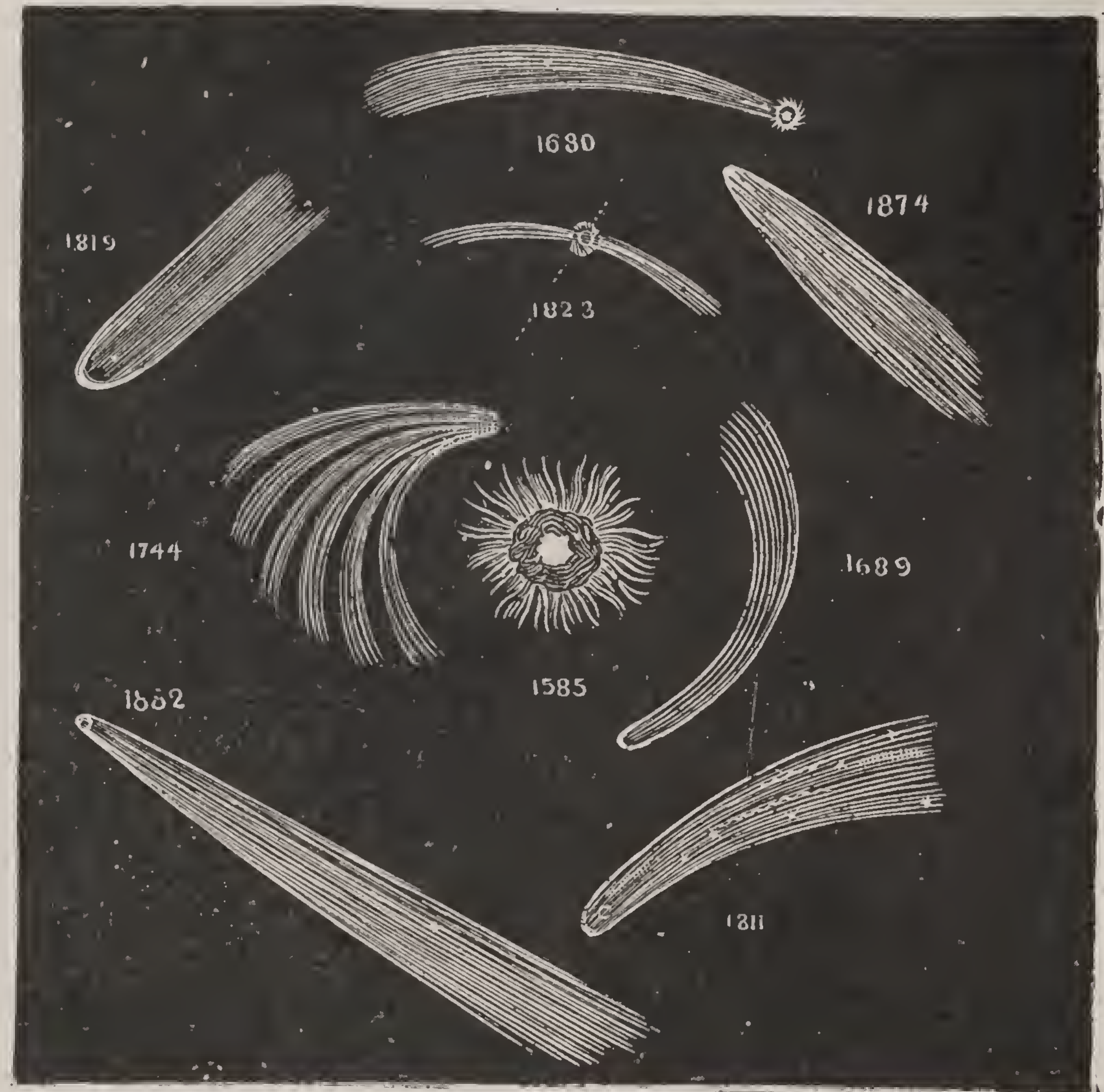
The chief point of difference between the and the planets is, that their orbits are ve longated; and, instead of being nearly cirular, they take the elliptical form. In onsequence of the nature of these orbits, he same comet may approach very near the un, and afterwards travel from it to immense listances. Thus, the period of the comet of 680 has been estimated at 3000 years. It pproaches the sun, so as to be nearer to it han our moon is to us, whilst it recedes to distance eight hundred and fifty-three times reater than the distance of the arth from the sun.

Great Velocity.

On the 17th of December, 680, it was at its perihelion—hat is, at its greatest proximity o the sun; it is now continung its path beyond the Nepunian orbit. Its velocity varies ccording to its distance from he solar body. At its perihelion t travels thousands of leagues er minute; at its aphelion it loes not pass over more than a ew yards. Its proximity to the un in its passage near that body aused Newton to think that it eceived a heat 28,000 times reater than that we experience t the summer solstice; and that his heat being 2000 times reater than that of red-hot ron, an iron globe of the same dimensions vould be 50,000 years entirely losing its eat.

Two thousand years ago, Seneca wrote: A day will come when the course of these odies will be known, and submitted to ules, like that of the planets. The prophecy f the philosopher is realized. It is now nown that, like the planets, comits gravitate ound the sun, and depend equally on its central attraction. Only, instead of moving in orbits, circular, or nearly so, they describe oval curves—very long ellipses. This is the great distinction established between them and planets. Instead of being opaque, heavy, and important bodies like our planets, they are of great lightness, and extreme tenuity.

But there are many comets which astronomers can prove will never again return to the neighborhood of the sun. They come from the remote depths of space, at a stupendous distance from the sun and all his train of planets; on beginning to feel the effect of his attraction they move towards our system, and at length they come sufficiently near to it to be visible through a telescope, and as surely as they do so, so surely are they detected by the keen eyes of some of the numerous astronomers who are always



VARIOUS FORMS OF COMETS WITH THE DATES OF THEIR APPEARANCE.

on the watch for these bodies. They come on nearer to the sun, till their pace exceeds that of the earth itself, but they do not plunge headlong into him.

Notwithstanding the vast powers of his attraction, they just whirl around the mighty luminary. Exposed to the fearful heat of his beams, the tail is developed to an enormous length. By some unknown law, which Professor Tyndall has recently sought to explain in a very ingenious manner, the tail stands out away from the sun as the comet whirls around it; then, after having passed the sun, the comet retreats again. It gradually becomes fainter, gradually is lost sight of by our telescopes, gradually plunges again into the depths of space, never again revisit our sun, never again to be beheld human eye. Such is the history of many the great comets which at different tim have struck terror into the inhabitants of t earth—they have retreated never more return.

THE GREAT COMET OF 1843.

The great comet of 1843 was one the most remarkable ever o-served. The nucleus of th was so brilliant that it could seen with the greatest ease in fu daylight. This comet is remar able for coming nearer to the su than any other of these bodi whose paths have been dete mined with accuracy. It w found to approach the sun within a distance of thirty-thr thousand miles. It is easy to ca culate, though not easy imagine, what must be the he in such a position. It wou doubtless be many hundre times greater than the temper ture of molten iron.

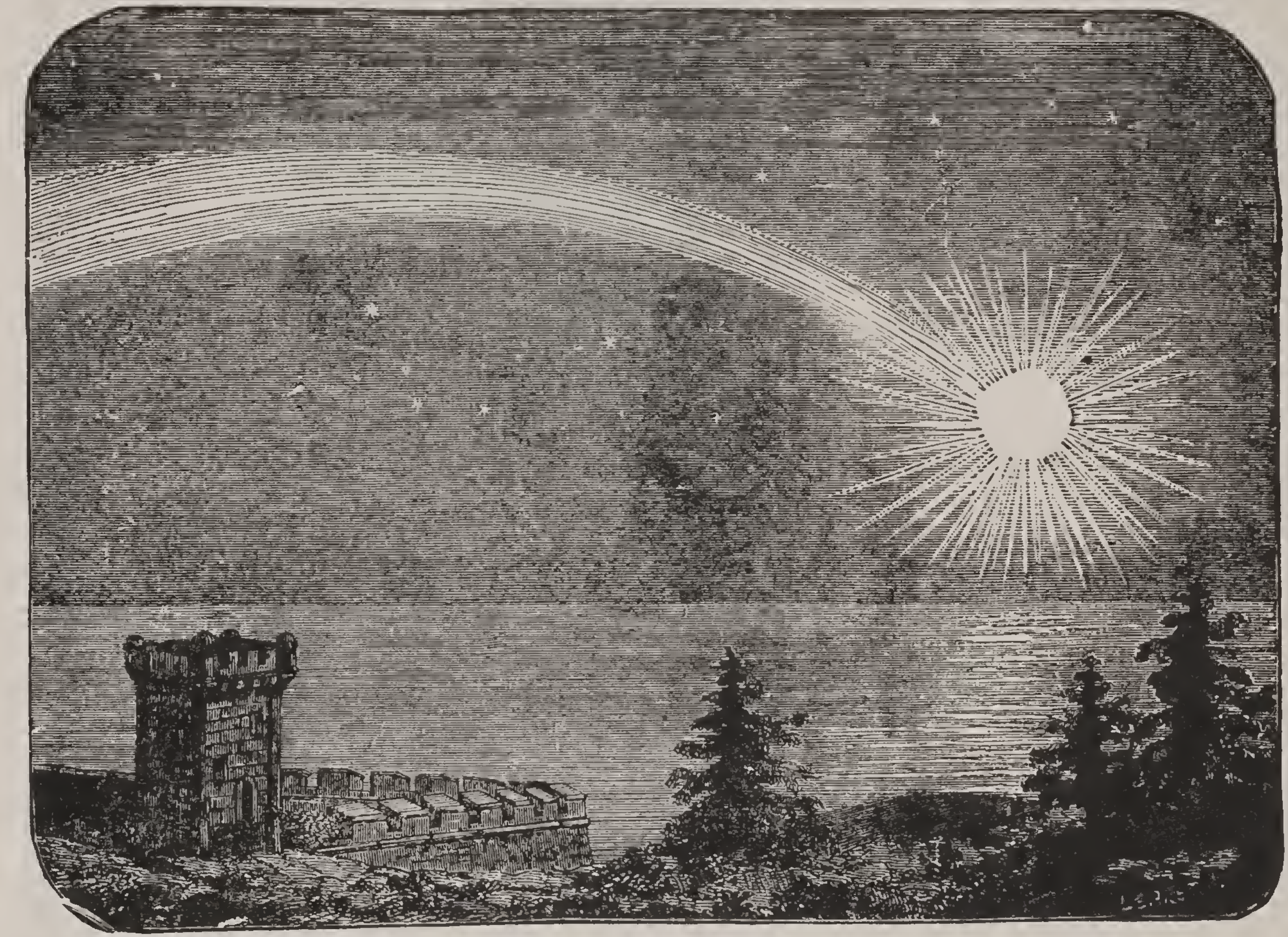
Strange Visitors.

The distinctive character comets lies especially in th length of their course, and in th immense duration of their jou neys round the sun, through th celestial regions. The followin lines are by the poet Conder:

Mysterious visitant, whose beauteous light
Among the wondering stars so strangely gleams!
Like a proud banner in the train of night,
The emblazon'd flag of Diety it streams—
Infinity is written on thy beams;
And thought in vain would through the pathless s
Explore thy secret course. Thy circle seems
Too vast for Time to grasp. Oh, can that eye
Which numbers hosts like thee, this atom eart
descry?

Meteorites are those solid fiery bodies hich from time to time visit the earth, veeping through the sky with immense elocity in every direction, and remaining sible but a few moments; they are generly attended by a luminous train, and durg their progress explosions usually occur, llowed by the fall of stones, to which the ame of aërolites is given.

We must not confound the magnitude of e meteorite with that of the aërolite, for e latter is nothing ore than a fragment rown off from the rmer and falling to e earth, while the ain body sweeps nward in its course. he diameter of the Veston meteorite as computed to be oo feet, and that of meteorite observed t Windsor, in ugust, 1783, was alculated to be no ss than 3210 feet, r more than threefths of a mile.



THE GREAT METEOR SEEN AT HURWORTH.

Meteors or shootg stars may be occasionally seen on any clear night, but it is bout the middle of August and November hat the display is most brilliant. Sometimes eteoric showers of several hours' duration re witnessed. Meteors are supposed to be mall bodies revolving around the sun, like e planets, in orbits which cross that of the arth. When the earth in its annual revoution arrives sufficiently near, under the inuence of its attraction they approach it with reat velocity, and on entering the atmoshere of the earth they take fire. In most cases they are consumed before reaching the earth, and thus disappear in the sky.

Sometimes, however, when the mass is large, a loud explosion takes place, and fragments from a few pounds to a ton in weight fall to the ground. In one case a meteoric stone nearly ten tons in weight was found in France. Such wanderers from far distant space or from other worlds are made up of materials similar to those we find in the earth—iron, nickel, quartz, talc, etc. These meteors, when large, are often inexpressibly brilliant. One seen at Hurworth, England, in 1854, lit up the heavens for half an hour with as bright a light as that of the sun, and finally burst with a thunderous explosion heard for many miles.

The periodical meteoric showers of August and November are caused by our orbit carrying us, at those periods of the year, right through great clusters of these aërolites. It has been estimated that not less than a hundred thousand million of them are annually

A SHOWER OF BRILLIANT METEORS ON THE OCEAN.

aught by our atmosphere; and when we consider the comparative smallness of the ring which we traverse, we can see that the absolute number of the meteorites belonging to our system mu be something incomparably exceeding huma calculation.

In the immediat neighborhood the sun, where hi attraction exercise the most direct an potent influence they will be foun in special abundance; and it is t the fact of their existence that w must look for a explanation of the corona, and perhaps of yet greate and more interesting mysteries o our system. The corona is simply the sunlight reflected from thei surfaces, as it i from the disks o the moon and planets. For a vast distance round the sun the whole firmament is powdered with them as thick as hailstones, and the reflection from them produces a continuous luminous glow, lost indeed in the overpowering brightness of ordinary sunlight, but shining out with exquisite lustre when his direct beams are cut off from us.

Splendors of the Aurora

OF all optical phenomena, the aurora borealis, or the northern daybreak, is one of the most striking, especially in the regions where its full glory is revealed. It fires the sky above the horizon with shooting jets of flame.

What fills with dazzling beams the illumined air?
What wakes the flames that light the firmament?
The lightnings flash: there is bright splendor there,
And earth and heaven with fiery sheets are blent;
The winter's night now gleams with brighter, lovelier ray,
Than ever yet adorned the golden summer's day.

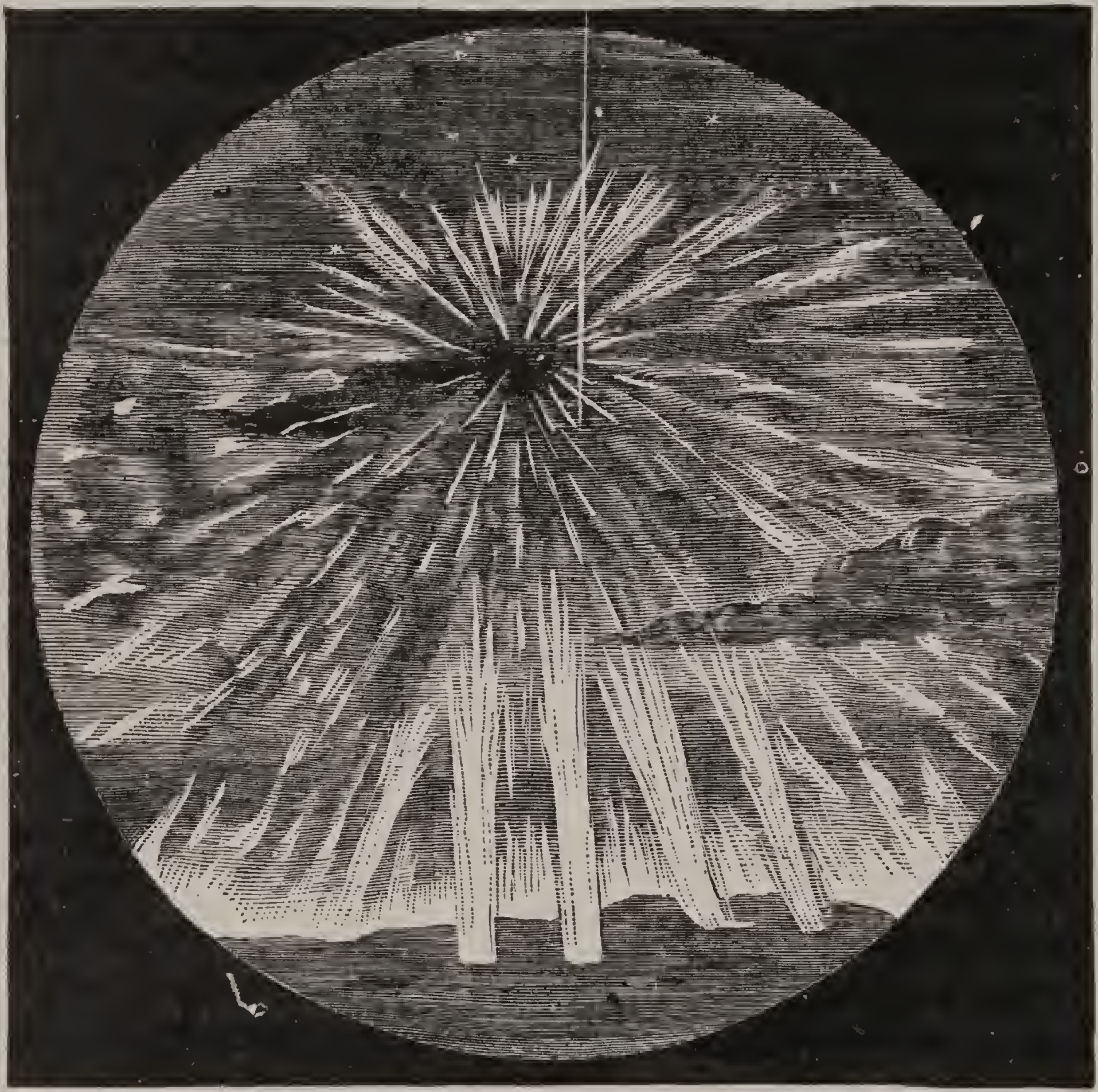
The appearances exhibited by the aurora are so various and wonderful. A cloud, or haze, is commonly seen in the northern region of the heavens, but often bearing owards the east or west, assuming the form of an arc, seldom attaining a greater altitude han forty degrees, but varying in extent rom five to one hundred degrees. The upper edge of the cloud is luminous, someimes brilliant and irregular. The lower part is frequently dark and thick, with the lear sky appearing between it and the horion. Streams of light shoot up in columnar orms from the upper part of the cloud, now xtending but a few degrees, then as far as he zenith, and even beyond it.

Instances occur in which the whole hemisphere is covered with these coruscations; but the brilliancy is the greatest, and the light the strongest, in the north, near the main body of the meteor. The streamers have in general a tremulous motion, and when close together present the appearance of waves, or sheets of light, following each other in rapid succession. But no rule obtains with reference to these streaks, which have acquired the name of "the merry dancers," from their volatility, becoming more quick in their motions in stormy weather, as if sympathizing with the wildness of the blast. Such is the extraordinary aspect they present, that it is not surprising the rude Indians should gaze upon them as the spirits of their fathers roaming through the land of souls. They are variously white, pale red, or of a deep blood color, and sometimes the appearance of the whole rainbow as to hue is presented.

Vivid Illumination.

When several streamers emerging from different points unite at the zenith, a small and dense meteor is formed, which seems to burn with greater violence than the separate parts, and glows with a green, blue, or purple light. The display is over sometimes in a few minutes, or continues for hours, or through the whole night, and appears for several nights in succession. Captain Beechey remarked a sudden illumination to occur at one extremity of the auroral arch, the light passing along the belt with a tremulous, hesitating movement towards the opposite end, exhibiting the colors of the rainbow; and as an illustration of this appearance, he refers to that presented by the rays of some molluscous animals in motion.

Captain Parry notices the same effect as a common one with the aurora, and compares it, as far as its motion is concerned, to a person holding a long ribbon by one end, and giving it an undulatory movement through its whole length, though its general position remains the same. Captain Sabine likewise speaks of the arch being bent into convolutions, resembling those of a snake in motion. Both Parry, Franklin and Beechey agree that no streamers were ever noticed shooting downwards from the arch.



AURORAL FLAMES IN THE NORTHERN SKY.

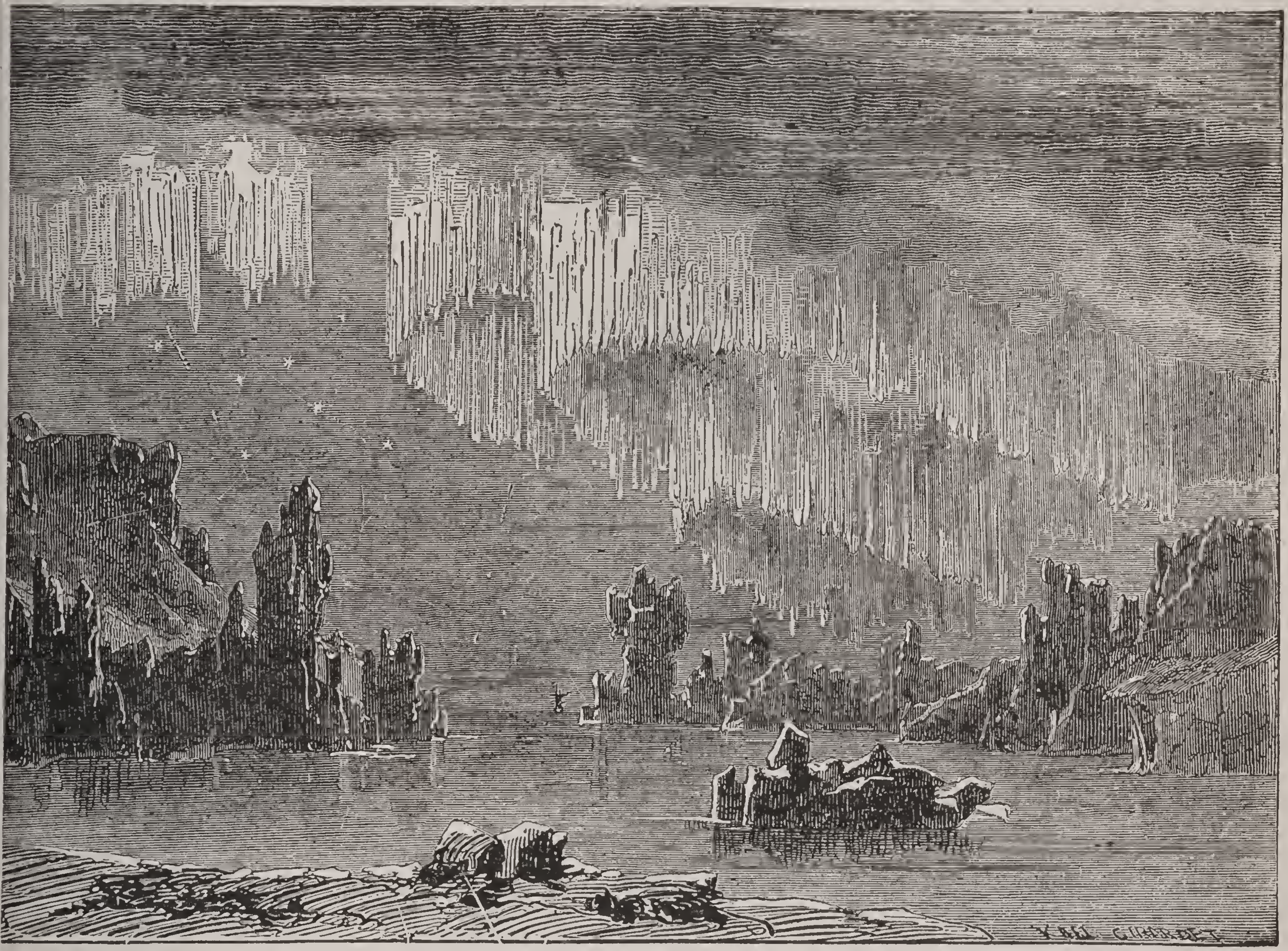
The preceding statement refers to aurora in high northern latitudes, where the full magnificence of the phenomenon is displayed. It forms a fine compensation for the long and dreary night to which these regions are subject, the gay and varying aspect of the heavens contrasting refreshingly with the repelling and monotonous appearance of the earth. We have already stated that the direction in which the aurora generally makes its first appearance, or the quarter in which the arch formed by this meteor is usually seen, is to the northward.

Effulgent Arch.

But this does not hold good of very high latitudes, for by the expeditions which have wintered in the ice, it was almost always seen to the southward; while, by Captain Beechey, in the "Blossom," in Kotzerne Sound, two hundred and fifty miles to the southward of the ice, it was always observed in a northern direction.

Dalton has furnished the following account of an aurora, as observed by him: Attention was first excited by a remarkably red appearance of the clouds to the south, which afforded sufficient light to read by at eight o'clock in the evening, though there was no moon nor light in the north. From half-past nine to ten there was a large, luminous, horizontal arch to the southward, and several faint concentric arches northward. It was particularly noticed that all the arches seemed exactly bisected by the plain of the magnetic meridian.

At half-past ten o'clock streamers appeared, very low in the southeast, running to and fro from west to east. They increased in number, and began to approach the zenith, apparently with an accelerated velocity, when all on a sudden the whole hemisphere was covered with them, and exhibited such an appearance as surpasses all description. The intensity of the light, and prodigious number and volatility of the beams, the grand intermixture of all the prismatic colors in their utmost splendor, variegating the glowing canopy with the most luxuriant and enchanting scenery, afforded an awful, but at the same time the most pleasing and sublime spectacle in nature. Every one gazed with astonishment, but the uncommon grandeur of the scene only lasted one minute. The variety of colors disappeared, and the beams lost their lateral motion, and were converted into the flashing radiations.



BRILLIANT AURORA BOREALIS IN THE ARCTIC SEAS.

The great distinction between the polar countries and the other regions of the globe, is their long day and long night. Describing an immense spiral around the horizon, the sun gradually mounts to the highest point of his course; then, in the same manner, it returns towards the horizon, and bids farewell to the earth, slowly dying away in a gloomy and ghastly twilight. And, for six months, the Arctic wildernesses knew it not.

When the navigator, says Captain Parry, finds himself buried for the first time in the silent shadows of the polar night, he cannot conquer an involuntary emotion of dread; he feels transported out of the sphere of ordinary existence. These deadly and sombre deserts seem like those uncreated voids which Milton has placed between the realms of life and death. The very animals are affected by the melancholy which veils the face of nature. Under the influence of the almost perpetual gloominess Dr. Kane's Newfoundland dogs went mad, and died.

Dazzling Radiance.

But if the sun for six months of the year deprives the circumpolar countries of the splendor of its fires, an imposing phenomenon frequently illuminates the long nights with dazzling radiance, as if nature sought to compensate for the absence of the orb of day by the most impressive of all her optical wonders. The polar nights are nearly always lighted up by the gorgeous lustre of the aurora; called borealis or australis, according to the poles at which it is produced. Shafts and rays of light shoot upwards to the zenith. These luminous sheaves pass through all the colors of the rainbow; from violet and sapphire to green and purple-red.

Sometimes the columns of light issue from the resplendent arch mixed with blackish rays; sometimes they rise simultaneously at different points of the horizon, and unite to form a sea of flame pervaded by rapid undulations. On other occasions, fiery dazzling standards are unfurled to float lightly in the air. A kind of canopy of soft and tranquil light, which is known as the corona, announces the close of the phenomenon. Thereupon the luminous shafts begin to wane in splendor, the richly colored arcs dissolve, die out, and soon of all the magnificent spectacle nothing remains but a whitish cloudy haze.

The arch of the aurora is only part of a ring of light, which is elevated considerably above the surface of our globe, and whose centre is situated in the vicinity of the pole. It is easy, then, to account for the different aspects it presents to observers placed at different angles to it. A person some degrees south of the ring would necessarily see only a very small arc of it towards the north, from the interposition of the earth between him and the observer; if he stood nearer the north, the arc would appear larger and higher; if immediately below it, he would see it apparently traversing the zenith; or if within the ring, and still further north, he would suppose it to culminate in the south. It is supposed that the centre of the ring corresponds with the magnetic north point, in the island of Boothia Felix.

Magnetic Needle Affected.

The phenomenon generally lasts several hours, and is frequently diversified by peculiar features; so that sometimes it seems to present the hemispherical segment of a gigantic wheel; sometimes it waves and droops like a rich tapestry of colored light, in a thousand prismatic folds; and, at other times, it may be compared to a succession of resplendent banners, or streamers, waving in the dark and intense sky.

The arch varies in elevation, but is seldom found more than ninety miles above the terrestrial surface. Its diameter must be enormous, for it has been known to extend from Italy to the polar regions, and has been simultaneously visible in Sardinia, Connecticut, and New Orleans.

Of the magneto-electric origin of the aurora no doubt can be entertained. When it occurs, the magnetic needle is invariably affected, the very noticeable perturbation being greatest at the climax of the auroral brilliancy.

PHENOMENA OF LIGHT

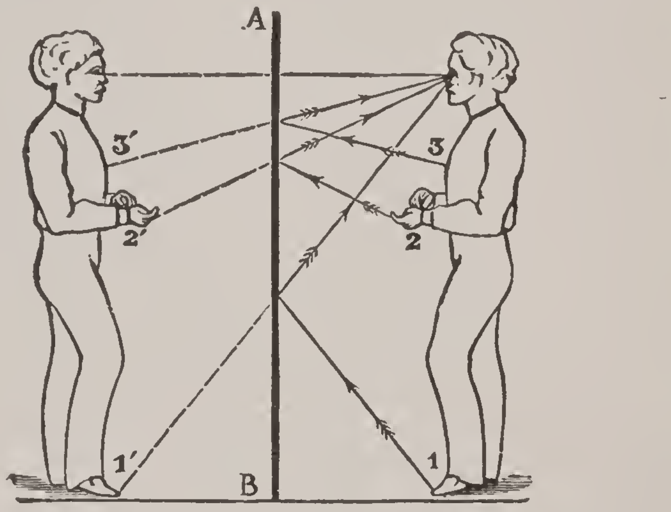
SUBSTANCES which are not sources of light have the power to reflect it from their surfaces when it falls on them. Thus glass is a very good reflector; and the still surface of water is also exceedingly good in this respect, so that as you walk along the bank of a river its surface may appear like pearl by reflecting the white light of the clouds, and its margin greener than the emerald in mirroring the grassy lopes of the bank on the other side.

We are now in a position to consider the ormation of the image in a large lookinglass. The observer standing on the right eceives borrowed light proceeding from the oints 1, 2 and 3 (see figure), which is again eflected from the surface of the glass into is eye. As a result the observer perceives is very image at each of the three points , 2 and 3, appearing behind the glass at 1′, ′ and 3′, and the same with all the points etween and around which make up the bject and image.

A Curious Effect of Reflection.

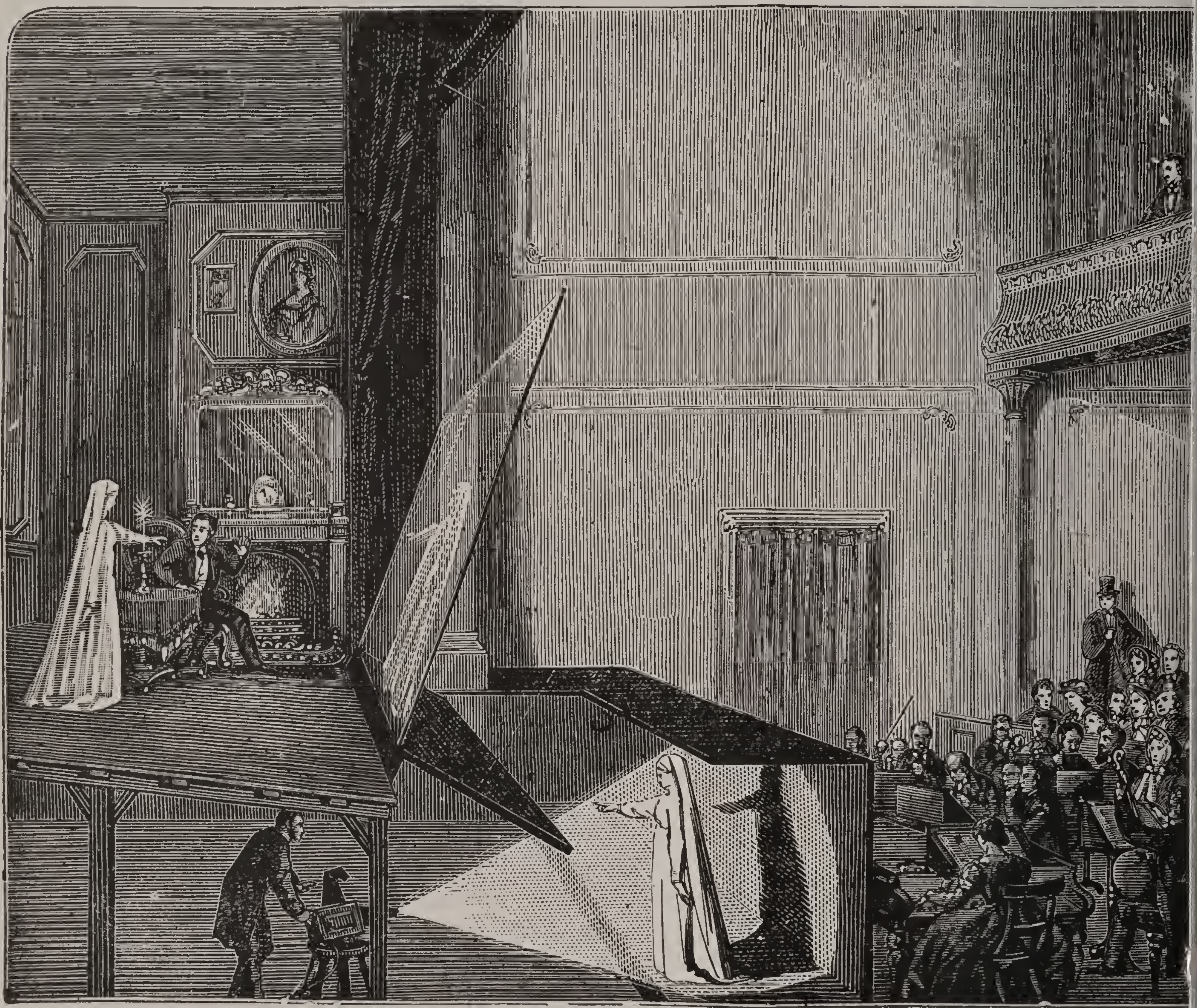
If you take this book and turn any of its ages towards a looking-glass, you will find, pon attempting to read the reflected print, at you cannot do so at all. The word AGIC, for example, appears as if it were versed; and so with any other word, for they look just as they would if we could take each word and turn it completely over around one end as centre. This phenomenon is known as *lateral inversion*, and you really see it when you look at your image in a looking-glass, for the left side of your face appears really as the right side in the looking-glass, and so on.

You would have to travel now for many a day to find an educated person who believes in ghosts. Time was, however, when you would have to travel quite as long to find some one who did not believe in them. There could then be found people who had seen them, so they thought, with their own eyes, and therefore were as much convinced of their reality as Hamlet was when he saw the ghost of his father at Elsinore. The belief still exists in unfrequented nooks—places where advanced ideas are a long time in reaching—and it exists alongside with a belief in witchcraft and such like nonsense. When a ghost appears nowadays, an investigation—not always of the gentlest kind—has generally shown that the sheeted spectre has been made of solid flesh, much too solid



HOW YOU SEE YOURSELF IN A MIRROR.

to vanish or permit of a stout cudgel passing through it. By universal consent, then, ghosts are now relegated to the stage. How real they appear there probably every lad is aware, for has he not seen them in white flowing robes, walking along and speaking, and exhibiting the ghostly attribute of permitting a performer to run his sword through them without their being in the least affected?



THE FAMOUS PEPPER GHOST.

For many a day after he has doubtless wondered how the thing was done, and has at last given it up in despair, while all the time the explanation was to be had without stepping out of doors even, so very easy to understand are some of these things.

Often, when you have stood gazing out the window in the evening, you have see as if outside, a lamp or gas-jet, but the exa picture of the light within the room. T *ghost* of the light, it is plain at once to se results from the transparent pane of gla just opposite you acting as a reflector. Pe per's famous ghost is produced just in t same way.

A large plate of transparent glass on t stage faces the audience, being inclined at angle of 45°. Below this the actor stan in a pit, with a strong light falling on hi The audience cannot see him, but his ima as reflected from the glass is very a parent, and seems to be on the stage and somewhere behind the transparent reflector, so that in gazing steadfastly at the ghost you fail to perceive the glass which produces it. Ghosts produced in this way are often shown, but you will have no difficulty in detecting the large plate of glass on the stage now that your attention is directed to it.

Long-Distance Signals.

Often during the campaigns in Zululand, Afghanistan and Cuba a peculiar mode of transmitting news was adopted when the telegraph lines had been cut by the enemy, or where no telegraph lines had been erected. The plan is so exceedingly simple that you will understand it at once. You have often noticed that the window-panes of houses miles away have looked like burnished gold; it has happened at such times that they were so placed with reference to the sun and yourself that the light from the great luminary has been reflected from them straight in your direction. A single bit of looking-glass placed in the same plane as these windows would have acted just in the same way.

Now suppose you have a comrade on a listant hill, with a piece of looking-glass so laced that the light of the sun or moon is ent in your direction, you could see the lare a great many miles away, and each ime he brought his cap before it the bright oint would disappear. If, therefore, you ave arranged with your friend that a cerain number of times of taking his cap away rom the mirror—that is, of producing a iven number of flashes—shall mean a cerain thing, he is able to communicate with ou; and if you have a mirror too, you may ommunicate with him, and so hold a conersation.

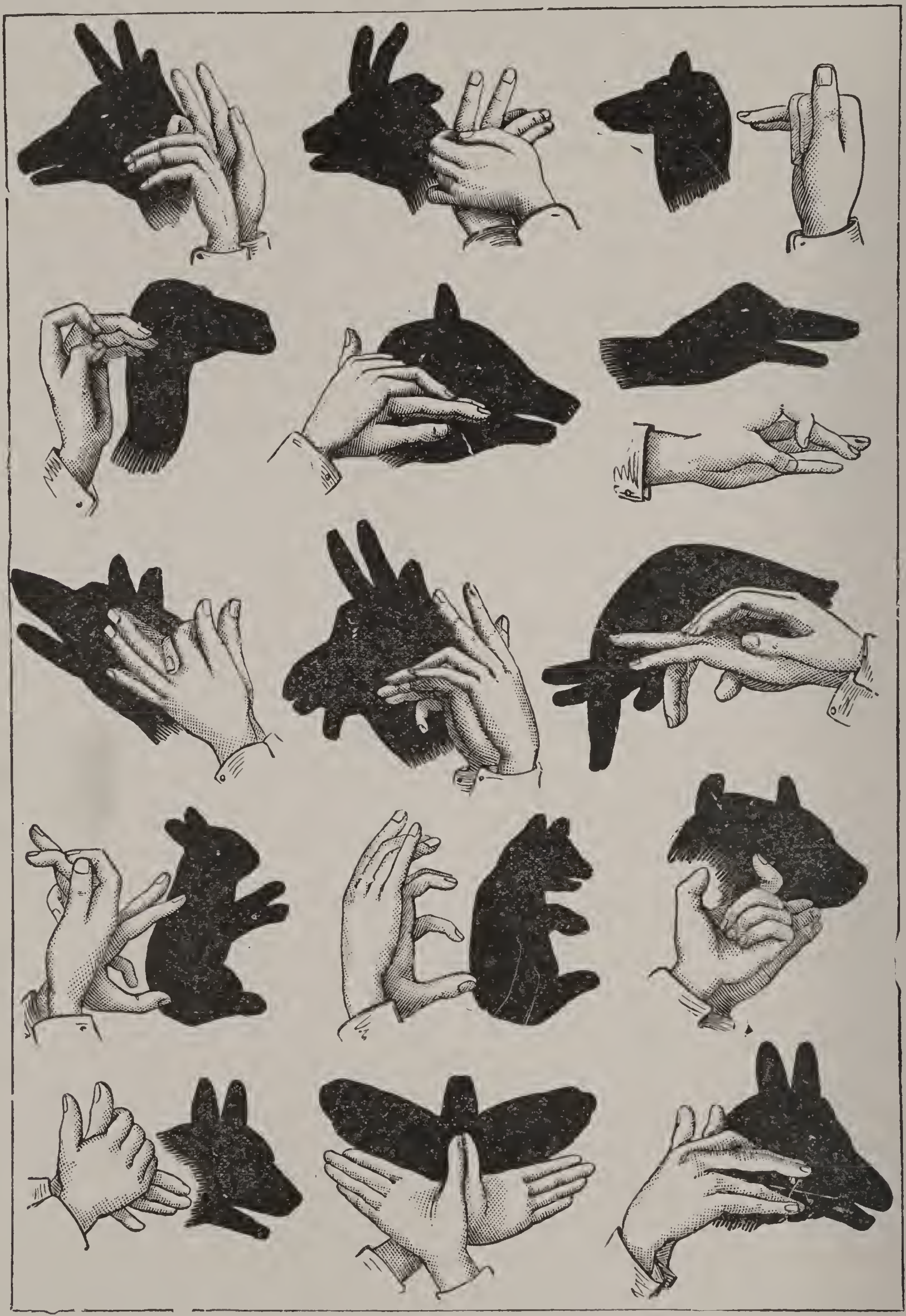
Often in this way has one camp flashed news to another over the heads of their common enemies, and the line of communication could not be cut, as would have been the case had the two camps been connected by ordinary telegraph. Here, then, we see one of the most elementary principles in Physics employed for a very important purpose.

Many a time in thoughtful mood you will have watched the dancing shadows formed by the flickering firelight, and perchance, as your own shadow has suddenly appeared on the wall behind you, you have given a start at its giant size and extraordinary form. You can readily perceive the cause of such a shadow, which is briefly this—that light from the fire travelling in straight lines cannot pass round corners to any marked extent, so that when an object stands in its way all behind it is in darkness, and the form of this area of darkness will vary with each movement. Hence, from the same object employed as a light obstructor a wonderful variety of shadow-forms may be produced, and perhaps in nothing is this so remarkably shown as in hand-shadows.

Singular Shadow-Pictures.

In the accompanying cut you have a variety of hand-shadows with the particular disposition of the hands which is required to produce them. Other forms of hand-shadows you will doubtless find out as you are practicing these, and they will afford many a half-hour's amusement as you lead out your shadow-animals, including the bear and the goat, the dog and the pig, and a host of others.

We need scarcely give any directions as to their production, for, if the gas-light be, say, in the middle of the room, and you want to cast the hand-shadows on a particular wall, the hands are brought between the gas-light and the wall, and their distance from the former is regulated according to your wish as to the size of shadow you want. We may add that you will be able easily to represent the jaws of your hand-shadows moving by bringing together and separating the parts which give rise to the shadow o the mouth. Moreover, if you are able to imitate the sounds of any of the beasts whose hand-shadows you can form—as, for example, the bark of the dog, the bray of the donkey, and the lowing of the cow—your entertainment becomes complete.



HAND-SHADOWS OF ANIMALS.

COMPARATIVE PHYSIOGNOMY

Face Reading

THE study of character and its indications is as old as human inquiry, and therefore the tendency of mind in this direction must arise from a special mental trait. The changing expression of the face is everywhere regarded as a mirror in which the passing thought or present emotion can be seen.

If one be long afflicted by grief or blessed by joy, wearied by trouble or vexed with care, shadowed with melancholy or excited by wit, inspired by faith or led by conscience, inflated by pride or subjected to its domination, the emotions awakened by these different states and revealed in the face, may become so far fixed as to defy concealment. But let one's circumstances be suddenly changed; let grief be turned to joy, and trouble, care, and vexation will fade from the countenance and leave scarcely a trace.

Then there are expressions of face inherited from joyous or sorrowing parentage. In the same family one child absorbs the sunshine of its mother's joy, and it glows from its face for a lifetime; another, if circumstances have changed, will wear the tear marks, or the expression of bitterness that darkened the mother's life; and no doubt the brain as well as the face will bear a similar and even more permanent record.

The very attitudes and motions assume, by long habit, an expression of the inner life. One accustomed to the exercise of authority gets a stiffer spine, a more exalted head, and firmer lines of the face, and the brain conforms in development and activity to the conditions that have become habitual.

For centuries the face has been studied, and attempts have been made to reduce the face to a science with greater or less approaches to success. People will study the face and its expression and be influenced by it without having any science or rules for it, or any means of explaining it. Yet their impressions will be correct.

Likeness Between Men and Animals.

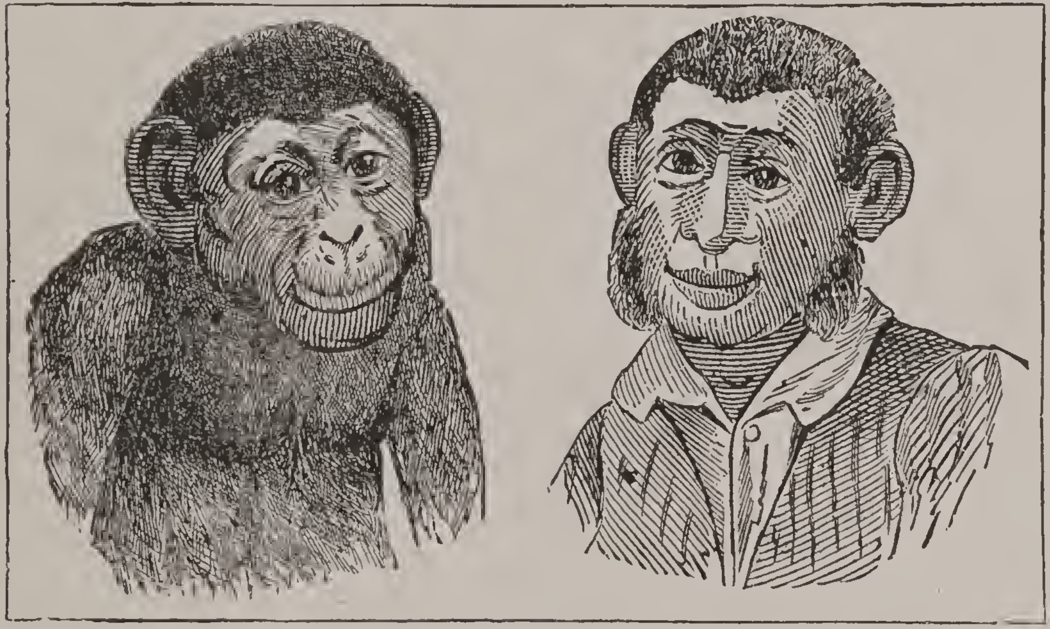
It is interesting to note the very striking facial resemblance between men and some of the animals, as shown in the accompanying engravings. The animal world appears to have been created on one general plan, and types of face and features among the lower orders are constantly reproduced among the higher.

Near the close of the last century the physiology of the brain became the subject of special investigation by an eminent physician of Germany, Dr. Gall, and he claimed that he had discovered signs of character in the brain, that it can be safely studied as the basis of character, and that whatever the face or attitudes or motions may reveal, the impulse comes from the brain. His mode of investigation has acquired the name of Phrenology.

A STRIKING PAIR.

For nearly a hundred years the term Phrenology has been before the world, and has been understood to relate to the laws and activities of the human mind, and that in some way it is related to the brain as its organ. A few have studied Phrenology and accepted it heartily; others have made it a topic for contempt or ridicule, and, though thousands of the general public have little or no knowledge on the subject, other thousands have more or less information respecting it, and, so for as they understand it, they believe and accept it.

A brief outline of the doctrines of Phrenology may here be made :



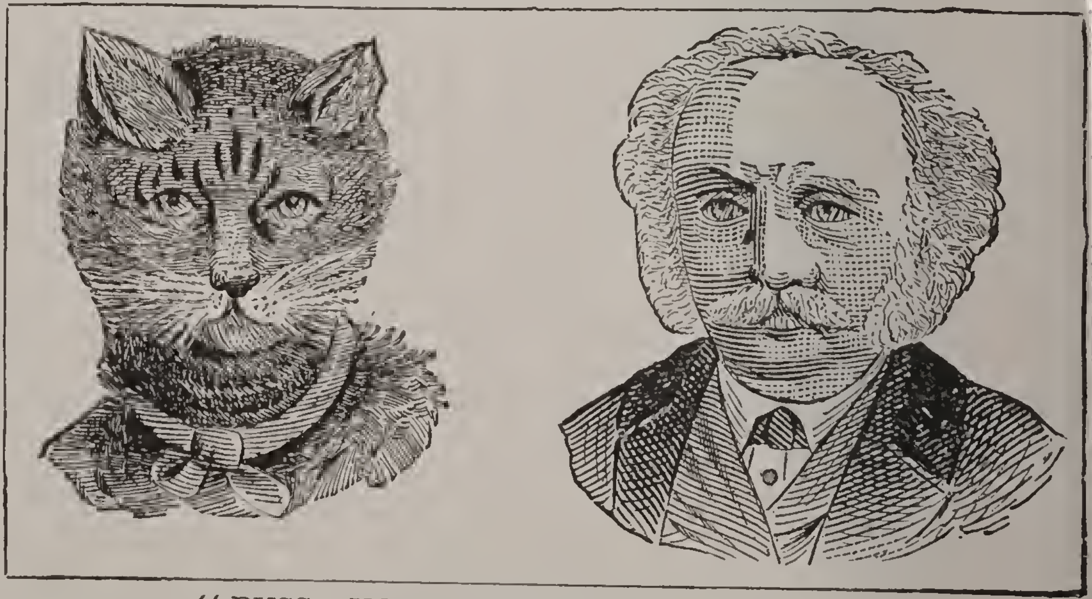
APE. APISH.

First. The brain is the organ or instrument of the mind, just as the eye is the instrument of sight. Every trait of character, every talent, propensity, or sentiment has its organ.

There is a general belief that somehow the *intellect* stands related to the brain, and when an injury to any part of that viscus occurs, the newspapers will say that the intellect was, or was not, affected by the injury. But a doubt exists whether the brain is also the seat of the feelings and the propensities.

To say that some injury of the brain did not affect the intellect, is about as definite as it would be to say that a man was injured in the head, but that his eye-sight, or his smelling power, or his hearing was not affected, and therefore eye-sight and hearing do not necessarily belong to the head; but Phrenology teaches that every sentiment, every element of taste and aversion, of hope and fear, of love and hatred, as well as the *intellectual faculties* and *memory*, have their special seats in some part of the brain.

Second. The mind is not a single power, but has many faculties, some of which may be stronger or weaker than the others in the same person; from which arises the great variety of character.



"PUSS, YOU REMIND ME OF ——."

Third. Each faculty or propensity of the mind has its special organ in the brain.

Fourth. Size of brain, the quality being good, is the true measure of its power. The brain, when deficient in size or low in quality or health, is always connected with a low degree of mental power. Even among the lower animals the brain is found to be large and complicated in proportion to the variety and strength of their faculties.

OWL. OWLISH.

Fifth. There are several groups of faculties, and each of these groups is represented by organs located together in the brain. The organs of the intellect are situated in the forehead in what are called the *anterior lobes* of the brain; those of the social nature in the back head, or *posterior lobes* of the brain; those of passion, appetite, and self-preservation, in the side head, or *middle lobes* of the brain; while those organs which manifest aspiration, pride, ambition, are in the crown of the head, and those of sentiment, sympathy, morality and religion in the top head.

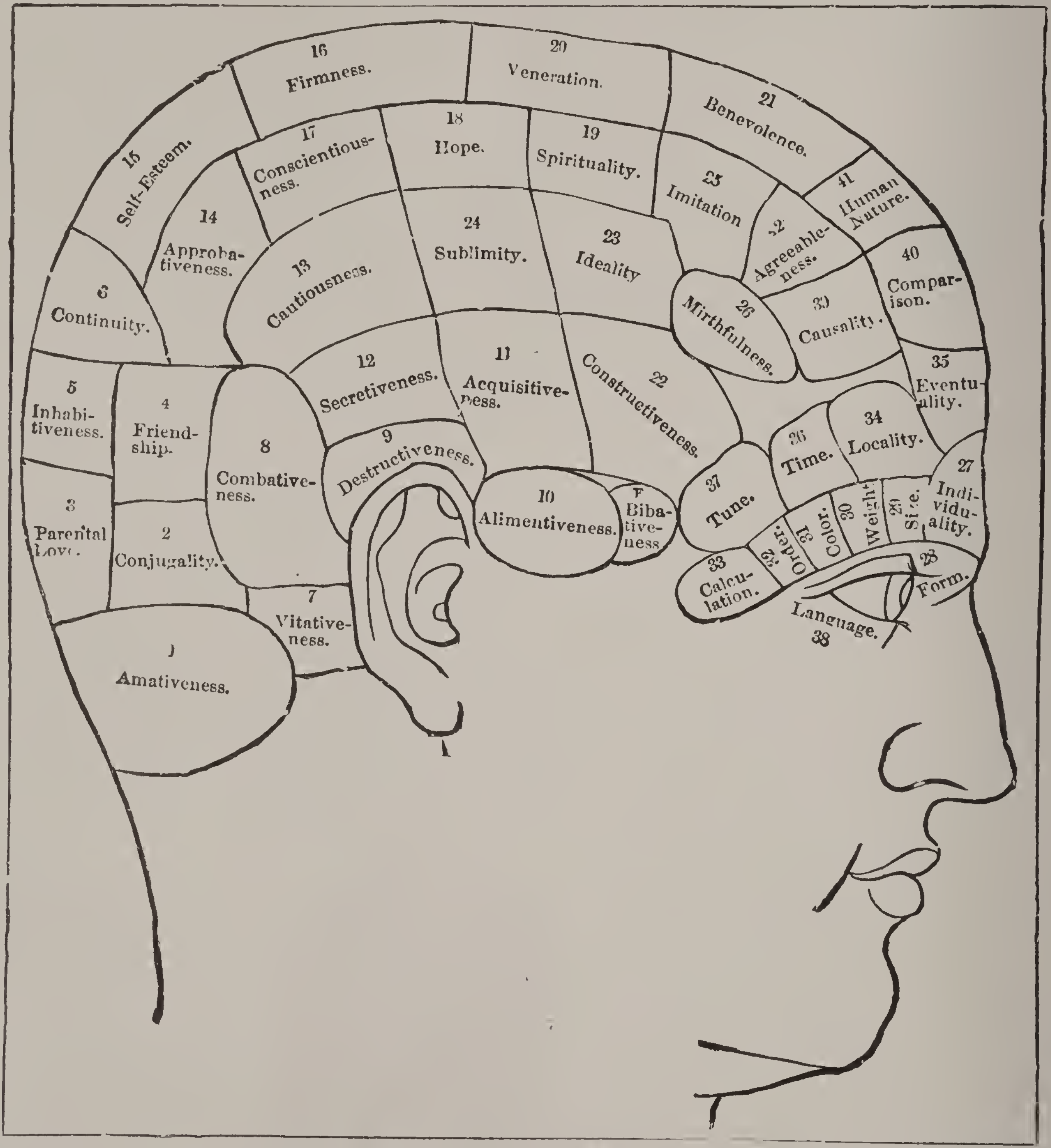
Sixth. Each faculty of the mind, each sentiment and propensity, has its own organs, as each function of the body has its specific organ. If this were not so, each person would manifest the same amount of talent or power on all subjects, such as arithmetic, language, music, mechanism, the power of reasoning, love of property, courage, prudence or pride. Everybody knows that persons rarely ever show equal talent on all topics, and that a man may be a genius at one thing and find it impossible, by long training, to become even tolerably successful in other things. If the mind were a single power and the brain a single organ this would not be the case.

The senses of seeing, hearing, tasting, smelling, are not always possessed by each person in an equal degree of perfection, these several powers being dependent on different organs, and each related to a special part of the brain; so the mental faculties and dispositions are alike unequal in a given person, owing to the greater strength or weakness of their respective organs in the brain; hence some people represent partial genius, others partial idiocy or partial insanity, and these facts are explained and sustained only by the phrenological theory of the mind.

MARKED RESEMBLANCE.

Seventh. The Quality and Temperament of the organization determine of the degree of vigor, activity and endurance of the mental powers.

Temperament is indicated by external signs, including the build, complexion and texture. Men recognize different qualities in their judgment of horses, cattle and other stock, although they do not use the terms we apply to mankind. Men who deal in timber know that the quality of different kinds of wood has infinite variety; the spongy palmetto of the South, the soft texture of the willow, or the coarse character of the hemlock in contrast with oak, hickory, ebony, lignum vitæ, showing that contrasts of temperament or quality in wood are various.



LOCATION AND DESCRIPTION OF THE ORGANS AS FIXED BY PHRENOLOGISTS.

To a critical phrenologist and physiognomist as wide a range of quality may b found in the human race. Speed, activit strength, endurance in birds and horse are recognized and understood. The trin compact game-chicken that weighs fiv pounds finds little difficulty in vanquishin the clumsy, coarse and tall Shanghai c Chittagong that may turn the scales at fourteen pounds; and temperament is a term which, rightly understood, explains the reason of these peculiarities.

A practical knowledge of Phrenology is considered by many persons of great assistance in deciding what occupation a young man or woman should follow.

CURIOUS FACTS

THINGS NOT GENERALLY KNOWN

ALPS, THE.—These mountains comprise about 180 peaks, from 4,000 to 15,732 feet high, the latter being the height of Mont Blanc, the highest spot in Europe. The summit is a sharp ridge, like the roof of a house, consisting of nearly vertical granite rocks. The ascent of these awful solitudes is most perilous, owing to the narrow paths, tremendous ravines, icy barriers, precipices, etc.

In many places every step has to be cut in the ice, the party being tied to each other by ropes, so that if one slips he may be held up by the rest, and silence is enforced, lest the noise of talking should dislodge the avalanches of the Aiguille du Midi. The view from the mountain is inexpressibly grand.

On the Alps, the limit of the vine is an elevation of 1,600 feet; below 1,000 feet, figs, oranges and olives are produced. The limit of the oak is 3,800 feet, of the chestnut 2,800 feet, of the pine 6,500 feet, of heaths and furze to 8,700 and 9,700 feet, and perpetual snow exists at an elevation of 8,200 feet.

ALCOHOL—WHO DRINKS IT?—It has been the endeavor of the census-takers, in 1890, to obtain, as far as possible, such facts as relate to the use of *alcohol as a beverage.* It appears that alcohol, as such (in some cases diluted with water, but without any coloring or extraneous flavoring), is used by a certain foreign element of our population. It is drunk to a great extent by Poles, Norwegians, Swedes, Finns, Hungarians and Russians. The quantity thus consumed is larger than is generally supposed.

Inquiry of some of the large houses in the Northwest, familiar with this particular trade, elicits the information that fully one-half of the alcohol sold in that section is drunk, it being the favorite beverage of these foreign races. It is estimated, by competent authority, that about fifteen barrels of alcohol are daily consumed for that purpose in New York city alone. A considerable amount is consumed by the same element in the coal regions of Pennsylvania, and undoubtedly in other localities.

BODY, THE HUMAN.—The average height of a newly-born infant is 18 inches; average weight, 6.77 lbs. The average weight of the newly-born male child is 7⅓ lbs., of the female child 6⅔ lbs. It takes 3 years for the child to grow the second 18 inches, so as to be 3 feet high.

Average weight of adult male, 145 lbs.; height, 5 ft. 7 inches; chest measurement of male, 36 inches; drawing strength between hands, 75 lbs.

The skeleton is one inch shorter than the measurement of the living person—skeleton weighs about 14 lbs.—there are 240 bones. The body contains about 12 lbs. of blood; about 6⅓ ozs. pass through the heart in each beat, and in adults from 65 to 75 beats occur per minute. All this passes through the lungs and is revivified by the oxygen of the air—as bright red blood goes by the subdivision of the arteries to every minutest portion of the body, and returns laden with impurities as dark venous blood through the veins to the heart again.

The heart is a little larger than the fist, and weighs about 9 to 11 ozs.

The adult male brain weighs 49 to 50 ozs., female 44 to 45 ozs.; the nerves of motion and sensation from every portion of the body end in the brain and spinal cord.

The lungs consist of about 174 million sacs or cells at the end of minute tubes that unite to form larger tubes, and these form the two bronchial tubes, and these unite in the windpipe, opening into the mouth and nose. At each breath the lungs are filled with air, the purpose of which is to oxygenate the blood. The blood absorbs about 30 ozs. of oxygen per day, sufficient to consume in the tissues of the body the carbon from about 3 lbs. of bread. The utmost amount of air expirable at one breath is calculated at 200 to 250 cubic inches.

The stomach lies beneath the lungs, near the centre of the body, and is a sac of a capacity of about a pint (without distension), in which the food is changed by the digestive juices and ferments.

The liver, to the right, and beneath the stomach, weighs 50 to 60 ozs.; it changes the starch of foods to sugar, secretes bile, and otherwise aids in digestion.

Spleen, to left of stomach, about the size of fist, weighs 5 to 7 ozs.; functions undetermined.

The intestines, about 34 feet in length; the digestion of the food and the absorption of its nutrient qualities into the lacteals and the blood is completed in the intestines.

The two kidneys weigh each about 4½ ozs.; about ,000 ozs. of blood passes through them in an hour, and by them the waste fluid portions of the food not useful to the blood are strained out. The waste fluids of the body are also exuded through the pores of the skin. The area of the surface of the body is about 2,500 square inches, it contains about 7,000,000 pores, each about ¼ of an inch long, or a total length of nearly 28 miles of pores.

The secretions of the body, saliva, gastric juice, chyle, bile etc., which are absorbed from the blood and reabsorbed by it in twenty-four hours, amount to 25 lbs. Adults require eight or nine hours' sleep.

CALLED OVER THE COALS.—Originally "hauled over the coals," derived from the ordeal by fire in early days, one form of which consisted in making the accused walk over burning coals. This method of persuasion was often employed to get money from Jews by the kings and barons of early centuries.

CITIES, FICTITIOUS NAMES OF.—Aberdeen, Scotland, Granite City.

Alexandria, Egypt, Delta City.

Alton, Ill., Tusselburgh.

Akron, O., Summit City.

Baltimore, Md., Monumental City.

Birmingham, O., Bran Town.

Boston, Mass., Puritan City; Modern Athens; Hub of the Universe; City of Notions; Athens of America; The Hub.

Brooklyn, N. Y., City of Churches.

Buffalo, N. Y., Queen City of the Lakes.

Cairo, City of Victory.

Cincinnati, O., Queen City; Porkopolis; Queen of the West; Paris of America.

Chicago, Ill., Garden City.

Cleveland, Forest City.

Dayton, O., Gem City of Ohio.

Detroit, Mich., City of the Straits.

Duluth, Minn., Zenith City.

Edinburgh, Scotland, Maiden Town; Northern Athens; Modern Athens; Athens of the North.

Gibraltar, Key to the Mediterranean.

Hannibal, Mo., Bluff City.

Havana, Cuba, Pearl of the Antilles.

Holyoke, Mass., Paper City.

Indianapolis, Ind., Railroad City.

Jerusalem, Palestine, City of Peace; City of the Great King.

Kansas City, Mo., Mushroomopolis.

Keokuk, Ia., Gate City.

Lafayette, Ind., Star City.

Limerick, Ireland, City of the Violated Treaty.

Lowell, Mass., City of Spindles; Manchester o America.

London, England, City of Masts; Modern Babylon.

Louisville, Ky., Falls City.

Madison, Wis., Lake City.

Milan, Italy, Little Paris.

Milwaukee, Wis., Cream City.

Minneapolis, Minn., City of Flour.

Nashville, Tenn., City of Rocks.

New Haven, Conn., City of Elms.

New Orleans, La., Crescent City.

New York, Gotham; Empire City; Metropolit City.

Pekin, Ill., Celestial City.

Philadelphia, Pa., Quaker City; City of Brotherly Love; City of Homes.

Pittsburg, Pa., Iron City; Smoky City; Birmingham of America.

Portland, Me., Forest City.

Paterson, N. Y., Lyons of America.

Peoria, Ill., Whisky Town.

Quebec, Canada, Gibraltar of America.

Quincy, Ill., Gem City.

Racine, Wis., Belle City.

Rome, Italy, Eternal City; Nameless City; Queen of Cities; Seven-Hilled City; Mistress of the World.

Rochester, N. Y., Flour City.

St. Louis, Mo., Mound City.

St. Paul, Minn., Gem City.

San Francisco, Cal., Golden City.

Salem, Mass., City of Peace.

Salt Lake City, City of the Saints.

Springfield, Ill., Flower City.

Streator, Ill., City of the Woods.

Toledo, O., Corn City.

Venice, Italy, Bride of the Sea.

Washington, D. C., City of Magnificent Distances.

Winnipeg, Manitoba, Gate City of the Northwest.

DIXIE.—An imaginary place, somewhere in the Southern States of America, celebrated in a popular negro melody as a perfect paradise of luxurious ease and enjoyment. The term is often used as a collective designation of the Southern States.

EARTH'S CENTRE.—All bodies weigh less the further removed they are from the centre of the earth. A block of stone weighing 700 pounds upon the seashore, will weigh only 699 pounds if carried up a mountain three miles high. A pendulum oscillates more quickly at the poles than at the equator, because the earth is flatter by twenty-six miles at the poles—that is, the "bob" of the pendulum is that much nearer the earth's center, and therefore heavier, and so swings more quickly.

El Dorado (*Spanish, the golden land.*)—A name given by the Spaniards to an imaginary country, supposed, in the sixteenth century, to be situated in the interior of South America, between the rivers Orinoco and Amazon, and to abound in gold and all manner of precious stones. Expeditions were fitted out for the purpose of discovering this fabulous region; and, though all such attempts proved abortive, the rumors of its existence continued to be believed down to the beginning of the eighteenth century.

"**Flying Dutchman.**"—The name given by sailors to a spectral ship, which is supposed to cruise in storms off the Cape of Good Hope, and the sight of which is considered the worst of all possible omens. She is distinguished from earthly vessels by bearing a press of sail when all others are unable, from stress of weather, to show an inch of canvas. The cause of her wanderings is variously explained. According to one account, a Dutch captain, bound home from the Indies, met with long continued head-winds and heavy weather off the Cape of Good Hope, and refused to put back, as he was advised to do, swearing a very profane oath that he would beat round the cape if he had to beat there until the day of Judgment. He was taken at his word, and doomed to beat against head-winds all his days. His sails are believed to have become thin and sere, his ship-sides white with age, and himself and crew reduced almost to shadows. He cannot heave to or lower a boat, but sometimes hails vessels through his trumpet, and requests them to take letters home for him. The superstition has its origin, probably, in the looming, or apparent suspension in the air, of some ship out of sight—a phenomenon sometimes witnessed at sea, and caused by unequal refraction in the lower strata of the atmosphere.

"**Golden Age**" **and** "**Iron Age.**"—The Elizabethan was the *Golden Age* of England, the Victorian is the *Iron Age*, the *Silver Age* was the reign of Queen Anne. The first named period was noted for giants of literature, simplicity of manners, integrity of conduct, honesty of intention, and domestic virtues. The second is an age of commerce and hard matter-of-fact. The third was noted for elegant refinement, delicacy of speech, luxurious living, politeness, and artificial manners.

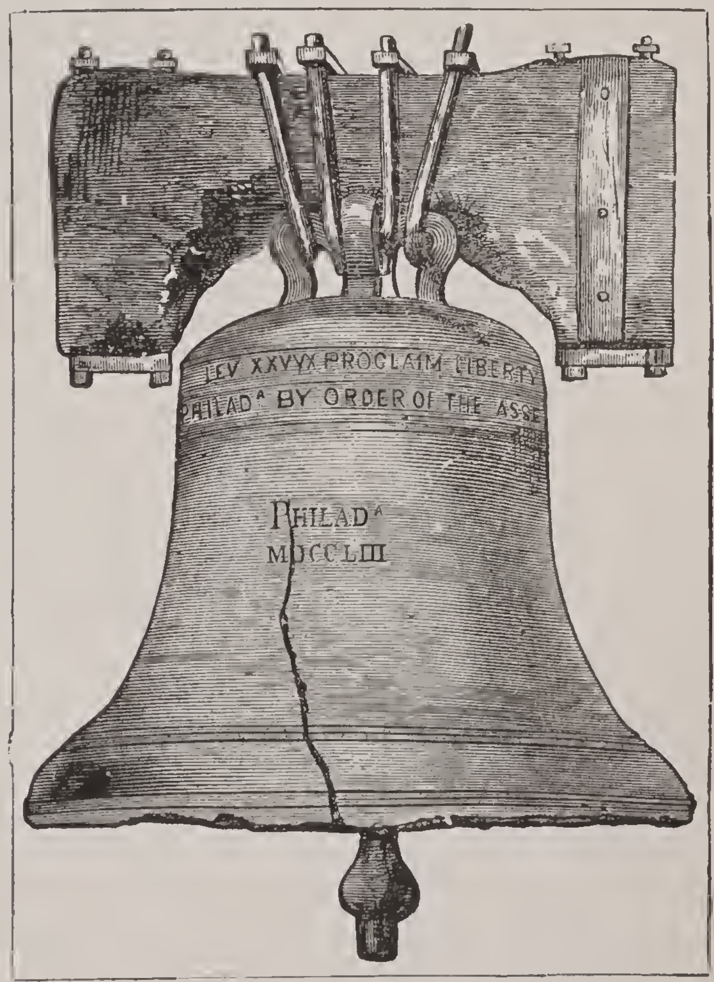
"**Go to Halifax.**"—Halifax law was, that the criminal should be "condemned first, and inquired upon after." Halifax also has the credit of inventing the rude guillotine of Maunaye, and easily became a place of terror to rogues. In the United States it is now used as a coarse expletive, Halifax, *i. e.*, Hell.

Hobson's Choice.—Tobias Hobson was the first in England who let out hackney horses. To each who applied, Hobson obliged him to take the horse which stood nearest the stable-door, hence the modern "Hobson's choice," meaning practically none. "Neck or nothing" commonly added was probably "Next or nothing."

John Bull.—This nickname is derived from the satire of Dr. Arbuthnot, representing the Englishman under that name as a bluff, kind-hearted and bull-headed farmer. In the minds of some it is associated with Dr. John Bull, organist to Queen Elizabeth, and a celebrated musician.

"**Kick the Bucket.**"—This term, meaning to die, alludes to the way in which a slaughtered pig is held up. The ends of a bent piece of wood, technically called a "bucket," are fastened behind the tendons of the hind legs in order to suspend the carcass. It has sometimes been said to have originated from a method of committing suicide by standing on a bucket, adjusting the noose and then kicking the bucket away.

Liberty Bell.—The order for the bell was given in 1751. The State House of Pennsylvania, in Philadelphia, work on which had been suspended for a number of years, was then approaching completion. The lower floors were already occupied by the Supreme Court in the chamber, while in the other assembled the Freemen of the Province of Pennsylvania, then consisting of one body. A committee was appointed by the Freemen, with Peter Norris as chairman, and empowered to have a new bell cast for the building. The commission for the



THE OLD LIBERTY BELL.

bell was in the same year awarded to Robert Charles, of London, the specification being that the bell should weigh about 2000 pounds and cost £100 sterling.

It was to be made by the best workmen, to be examined carefully before being shipped, and to contain, in well shaped letters around it the inscription: "By order of the Province of Pennsylvania, for the State House in the City of Philadelphia, 1752." An order was given to place underneath this the fatal and prophetic words from Leviticus xxv. 10: "Proclaim liberty throughout all the land, unto all the inhabitants thereof."

The reason for the selection of this text has been a subject of much conjecture, but the true reason is apparent when the full text is read. It is as follows: "And ye shall hallow the fiftieth year and proclaim liberty throughout the land and to all the inhabitants thereof." In selecting the text the good Quakers had in memory the arrival of William Penn and their forefathers more than half a century before.

In August, 1752, the bell arrived, but though in apparent good order, it was cracked by a stroke of the clapper while being tested. It could not be sent back, as the captain of the vessel who had brought it over could not take it on board. Two skillful men undertook to recast the bell, which, on being opened, revealed a bell which pleased very much. But it was also found to be defective. The original bell was considered too high, and a quantity of copper was added to the composition, but too much copper was added. There were a great many witticisms on account of the second failure, and the ingenious workmen undertook to recast the bell, which they successfully did, and it was placed in position in June, 1753.

On Monday the 8th of July (not the 4th), at noon, true to its motto, it rang out the memorable message of "Liberty throughout the land and to all the inhabitants thereof."

For fifty years the bell continued to be rung on every festival and anniversary until it eventually cracked. This happened in July, 1835, when it wa tolling for the death of Chief Justice John Marshall

An ineffectual attempt was made to cause it to continue serviceable by enlarging the cause of its dissonance and chipping the edges. It was removed from its position in the tower to a lower story, and only used on occasions of public sorrow, such as the death of ex-Presidents and statesmen. Subsequently it was placed on the original timbers in the vestibule of the State House, and in 1873 it was suspended in a prominent position immediately beneath where a larger bell presented to the city in 1866 now proclaims the passing hours.

Man in the Moon.—A name popularly given to the dark lines and spots upon the surface of the moon, which are visible to the naked eye, and which when examined with a good telescope, are discovered to be the shadows of lunar mountains. It is one of the most popular, and perhaps one of the most ancient superstitions in the world, that these lines and spots are the figure of a man leaning on a fork, on which he carries a bundle of thorns or brushwood, for stealing which on a Sunday he was confined in the moon. The account given in Numbers xv. 32 of a man who was stoned to death for gathering sticks upon the Sabbath-day, is undoubtedly the origin of this belief.

Monroe Doctrine.—In 1822, during the Presidency of James Monroe, the Spanish-American colonies having fought their way to independence as against Spain, they were recognized as an independent power by the United States. In his annual message to Congress in 1823, the President proclaimed the celebrated doctrine of non-interferance as follows: "That as a principle the American continents, by the free and independent position which they have assumed and maintained, are henceforth not to be considered as subjects of future colonization by any European power." This doctrine is attributed to Adams, who was Secretary of State under Monroe.

LEGAL FORMS

A HAND-BOOK OF LAW

THE following compilation of business law contains the essence of a large amount of legal erbiage: 1. If a note is lost or stolen, it does not elease the maker; he must pay it, if the consider-tion for which it was given and the amount can be roven.

2. Notes bear interest only when so stated.

3. Principals are responsible for the acts of their gents.

4. Each individual in a partnership is responsible or the whole amount of the debts of the firm, except n cases of *special partnership*.

5. Ignorance of the law excuses no one.

6. The law compels no one to do impossibilities.

7. An agreement without consideration is void.

8. A note made on Sunday is void.

9. Contracts made on Sunday cannot be enforced.

10. A note by a minor is voidable. A contract made y a minor is void.

11. A contract made by a lunatic is void.

12. A note obtained by fraud, or from a person in state of intoxication, cannot be collected.

13. It is a fraud to conceal a fraud.

14. Signatures made with a lead-pencil are good in aw.

15. A receipt for money is not always conclusive.

16. The acts of one partner bind all the rest.

17. The maker of an "accommodation" bill or note one for which he has received no consideration, hav-ng lent his name or credit for the accommodation of e holder) is not bound to the person accommodated, ut is bound to all other parties, precisely as if there as a good consideration.

18. No consideration is sufficient in law if it be *legal* in its nature.

19. Checks or drafts must be presented for payment ithout unreasonable delay.

20. Checks or drafts should be presented during siness hours; but in this country, except in the se of banks, the time extends through the day and ening.

21. If the drawee of a check or draft has changed s residence, the holder must use due and reasonable ligence to find him.

22. If one who holds a check, as payee or otherwise, transfers it to another, he has a right to insist that the check be presented that day, or, at farthest, on the day following.

23. A note indorsed in blank (the name of the indorser only written) is transferable by delivery, the same as if made payable to bearer.

24. If time of payment of a note is not named, it is payable on demand.

25. The time of payment of a note must not depend upon a contingency. The promise must be absolute.

26. A bill may be written upon any kind of paper, either with ink or pencil.

27. The payee should be named in the note, unless it is payable to bearer.

28. An indorsee has a right of action against all whose names were on the bill when he received it.

29. If the letter containing a protest of non-payment be put into the post-office, any miscarriage does not affect the party giving notice. Notice of protest may be sent either to the place of business or of residence of the party notified.

30. The holder of a note may give notice of protest either to all the previous indorsers or only to one of them; in case of the latter he must select the last indorser, and the last must give notice to the last before him, and so on. Each indorser must send notice the same day or the day following. Neither Sunday nor any legal holiday is counted in reckoning time in which notice is to be given.

31. The loss of a note is not sufficient excuse for not giving notice of protest.

32. If two or more persons, as partners, are justly liable on a note or bill, due notice to one of them is sufficient.

33. If a note or bill is transferred as security, or even as payment of a pre-existing debt, the debt revives if the note or bill be dishonored.

34. An indorsement may be written on the face or back.

35. An indorser may prevent his own liability to be sued by writing "without recourse" or similar words.

36. An oral agreement must be proved by evidence

A written agreement proves itself. The law prefers written to oral evidence, because of its precision.

37. No evidence can be introduced to *contradict* or *vary* a written contract; but it may be received in order to explain it, when such explanation is needed.

38. Written instruments are to be construed and interpreted by the law according to the simple, customary and natural meaning of the words used.

39. The finder of negotiable paper, as of all other property, must make reasonable efforts to find the owner, before he is entitled to appropriate it for his own purposes. If the finder conceal it, he is liable to the charge of larceny or theft.

40. Joint payees of a bill or note, who are not partners, must all join in an indorsement.

41. One may make a note payable to his own order and indorse it in blank. He must write his nan across its back or face, the same as any other indorse

42. After the death of a holder of a bill or note, h executor or administrator may transfer it by h indorsement.

43. The husband who acquires a right to a bill c note which was given to the wife, either before c after marriage, may indorse it.

44. "Acceptance" applies to bills and not to note It is an engagement on the part of the person o whom the bill is drawn to pay it according to it tenor. The usual way is to write across the face c the bill the word "accepted."

45. An account outlawed according to statute c state where it is contracted cannot be collecte unless judgment note has been given.

Business Agreements

AN agreement or contract is an arrangement entered into by two or more persons, by which each binds himself to perform certain specified acts within a designated time.

Agreements may be verbal, but it is better in all cases, and absolutely essential in matters of importance, to express them in writing.

Fraud annuls all contracts and obligations, and the party so wronged is relieved of his obligation by law. If both the parties to a agreement act fraudulently, neither can tak advantage of the fraud of the other; nor ca one who acts fraudulently set his own frau aside for his benefit.

Agreements should be prepared and signe in duplicate, triplicate, etc., according to th number of persons concerned in them. Eac party should have a copy, and should carefully preserve it.

General Form of Agreement.

THIS AGREEMENT, made this twenty-fifth day of September, in the year of our Lord one thousand eight hundred and ninety—, between John Swan, of Livonia, County of Livingston, State of New York, party of the first part, and Hiram Bolt, of the same place, party of the second part,

WITNESSETH, That the said John Swan, party of the first part, hereby covenants and agrees, that he will deliver to the said Hiram Bolt, party of the second part, during the month of September, one hundred cords of hickory wood, at the woodyard of the said Hiram Bolt, as follows: twenty cords to be delivered on or before the 10th of October; twenty cords more to be delivered on or before the 15th of October; twenty cords more on or before the 20th of October; twenty cords more on or before the 25th of October, and the remaining twenty cords on or before the 30th of October; the entire quantity of one hundred cords to be delivered by the 30th of October.

And the said Hiram Bolt, party of the second part, in consideration of the prompt fulfilment of thi agreement by the said John Swan, party of the firs part, agrees and binds himself to pay to the sai John Swan, the sum of three dollars for each an every cord of hickory wood delivered to him by th said John Swan or his agents, and to pay for eac cord of wood as soon as it is delivered at his woodyard.

In case of the failure of either party to this contract to make good his promises, it is hereby stipulated and agreed that the party so failing shall forfeit to the other party the sum of one hundred dollars in cash as fixed and settled damages.

IN WITNESS WHEREOF, the parties to these presents have hereunto set their hands and seals, the day and year first above written.

JOHN SWAN. [SEAL.]
HIRAM BOLT. [SEAL.]

Signed, sealed and delivered
in presence of }

Laws of Partnership

A PARTNERSHIP is an agreement between two or more persons for joining together their money, goods, labor, and skill, or any or all of them, in some lawful commerce or business, under an understanding, express or implied from the nature of the undertaking, that the parties to the agreement shall share between them the profits and loss arising therefrom.

It is not necessary that each partner should contribute an equal amount of money to be entitled to an equal share of the profits. An individual may contribute his knowledge of the business to be engaged in, or his skill, or his labor, or all three, the other partner or partners contributing a specified sum of money, or the money and their services. The agreement must state exactly what is contributed.

The act of one partner binds all the others. Thus, if one partner gives a negotiable note for the use of the firm, and signs it with his individual name, such signature binds all the other partners.

A person who contributes his money to the capital of a firm and shares its profits, without allowing his name to be used, is termed a secret or silent partner. A person contributing to the capital and sharing the profits of the concern, but taking no active part in its management, is termed a sleeping or dormant partner. Both of these are liable to creditors for the debts of the concern, even though they did not know them to be members of the firm.

In forming partnerships, it is generally the rule to form them for a stated period, which must be expressed in the agreement. This is termed a limited partnership, and expires "by limitation" at the end of the period named.

A Partnership Agreement.

THIS AGREEMENT, made this tenth day of June, 189–, between James Smith, of Salem, Washington County, N. Y., of the one part, and Henry Smythe, of the same place, of the other part, witnesseth:

The said parties agree to associate themselves as co-partners, for a period of five years from this date, in the business of buying and selling hardware and such other goods and commodities as belong in that line of trade; the name and style of the firm to be "Smith & Smythe."

For the purpose of conducting the business of the aboved named partnership, James Smith has, at the date of this writing, invested Five Thousand Dollars, as capital stock, and the said Henry Smythe has paid in the like sum of Five Thousand Dollars, both of which amounts are to be expended and used in common, for the mutual advantage of the parties hereto, in the management of their business.

It is further agreed that once every year, or oftener, should either party desire, a full, just and accurate exhibit shall be made to each other, or to their executors, administrators or representatives, of the losses, receipts, profits and increase made by reason of, or arising from, such co-partnership. And after such exhibit is made, the surplus profit, if such there be, resulting from the business, shall be divided between the subscribing partners, share and share alike.

[*Here state amount to be drawn out annually by each party.*]

It is also agreed that in case of a misunderstanding arising with the partners hereto which cannot be settled between themselves, such difference of opinion shall be settled by arbitration, upon the following conditions, to wit: Each party to choose one arbitrator, which two thus elected shall choose a third; the three thus chosen to determine the merits of the case, and arrange the basis of a settlement.

IN WITNESS WHEREOF, The undersigned hereto set their hands the day and year first above written.

JAMES SMITH.
HENRY SMYTHE.

Signed in presence of
JOHN JONES,
SAMUEL BROWN.

Deeds

IN this country, no lands can be transferred excepting by a deed, which must be properly signed, sealed, witnessed, acknowledged, delivered, and recorded. In some of the States, seals are not necessary to the validity of a deed.

A deed must be delivered in order to render it valid. There is no special form necessary to constitute a proper delivery. If the deed comes into the possession of the grantee with the knowledge and consent of the grantor, however it may have been gotten possession of, it is a valid delivery. If a man makes a deed and fails to deliver it, and dies with it in his possession, the deed is of no effect whatever. A deed to a married woma may be delivered either to her or to hi husband.

A deed must be recorded to be vali That is, the grantee must deliver it to th Recorder of Deeds, or other official appointe by law for that purpose, who must cause i to be copied in full in a book kept in hi office for that purpose. A deed is regarde as recorded from the moment it is placed i the hands of this officer, and he generall writes upon it the year, month, day, hour and minute when he received it.

Warranty Deed with Covenants.

THIS INDENTURE, Made this eighteenth day of March, in the year of our Lord 189–, between Ben Cooper, of Ramsey, County of Fayette, State of Illinois, and Mary, his wife, of the first part, and L. Y. Rood, of the same place, of the second part.

WITNESSETH, That the said party of the first part, for and in consideration of the sum of Three Thousand Dollars in hand, paid by the said party of the second part, the receipt whereof is hereby acknowledged, have granted, bargained, and sold, and by these presents do grant, bargain and sell, unto the said party of the second part, his heirs and assigns, all the following described lot, piece, or parcel of land, situated in the town of Ramsey, in the County of Fayette, and State of Illinois, to wit:

[*Here describe the property.*]

Together with all and singular the hereditaments and appurtenances thereunto belonging or in any wise appertaining, and the reversion and reversions, remainder and remainders, rents, issues, and profits thereof; and all the estate, right, title, interest, claim and demand whatsoever, of the said party of the first part, either in law or equity, of, in, and to the above bargained premises, with the hereditaments and appurtenances: To have and to hold the said premises above bargained and described, with the appurtenances, unto the said party of the second part, his heirs and assigns, forever. And the said Ben Cooper, and Mary, his wife, parties of the first part, hereby expressly waive, release and relinquish unto the said party of the second part, his heirs, executors, administrators, and assigns, all right, title, claim, interes and benefit whatever, in and to the above describe premises, and each and every part thereof, which given by or results from all laws of this State pe taining to the exemption of homesteads.

And the said Ben Cooper and Mary Cooper, h wife, party of the first part, for themselves and the heirs, executors, and administrators, do covenan grant, bargain, and agree, to and with the said part of the second part, his heirs and assigns, that at th time of the ensealing and delivery of these present they were well seized of the premises above conveyed as of a good, sure, perfect, absolute, and indefeasibl estate of inheritance in law, and in fee simple, an have good right, full power, and lawful authority t grant, bargain, sell, and convey the same, in manne and form aforesaid, and that the same are free an clear from all former and other grants, bargains sales, liens, taxes, assessments, and encumbrances o what kind or nature soever, and the above bargaine premises in the quiet and peaceable possession of th said party of the second part, his heirs and assigns against all and every person or persons lawfully claiming or to claim the whole or any part thereof the said party of the first part shall and will warran and forever defend.

In testimony whereof, the said parties of the firs part have hereunto set their hands and seals the day and year first above written.

BEN COOPER. [SEAL.]
MARY COOPER. [SEAL.]

Mortgages

A MORTGAGE is a deed conveying real estate to a creditor, as security for a debt. It conveys the property to him as fully and absolutely as though it were sold outright, with this difference, that the debtor retains by the terms of the deed the right to pay the debt and redeem the property within a specified time.

It is usual for the mortgage to contain an agreement that the mortgagor shall keep the premises insured in a certain sum for the benefit of the mortgagee. Where no such stipulation is made, and the mortgagee insures the premises, he cannot recover the cost of the insurance from the mortgagor.

Should a mortgagor erect buildings upon mortgaged land, the mortgagee, on taking possession, becomes the owner of these buildings also. If, however, the mortgagee erects buildings upon lands on which he holds a mortgage, the mortgagor, upon redeeming the land, becomes the owner of such buildings without paying the mortgagee for them. Such matters may, and should always, be regulated by an agreement between the parties.

Real Estate Mortgage to Secure Payment of Money.

THIS INDENTURE, Made this nineteenth day of October, in the year of our Lord, 189–, between W. H. Harrison, of Urbana, County of Champaign, and State of Illinois, and Helen, his wife, party of the first part, and Robert Fairchild, party of the second part.

WHEREAS, The said party of the first part is justly ndebted to the said party of the second part, in the um of Four Thousand Dollars, secured to be paid by wo certain promissory notes (bearing even date herewith), the one due and payable at the First National Bank at Champaign, Ill., with interest, on he nineteenth day of October, in the year 189–; the other due and payable at the First National Bank at Champaign, Ill., with interest, on the nineteenth day of October, 189–.

NOW, THEREFORE, THIS INDENTURE WITNESSETH, That the said party of the first part, for the better securing the payment of the money aforesaid, with interest thereon, according to the tenor and ffect of the said two promissory notes above menioned; and, also, in consideration of the further sum f one dollar to them in hand paid by the said party of the second part, at the delivery of these presents, the receipt whereof is hereby acknowldged, have granted, bargained, sold, and conveyed, nd by these presents do grant, bargain, sell, and onvey, unto the said party of the second part, is heirs and assigns, forever, all that certain parcel f land, situate, etc.

[*Describing the premises.*]

To have and to hold the same, together with all nd singular the tenements, hereditaments, privileges, and appurtenances thereunto belonging or in any wise appertaining. And also, all the estate, interest, and claim whatsoever, in law as well as in equity, which the party of the first part have in and to the premises hereby conveyed unto the said party of the second part, his heirs and assigns, and to their only proper use, benefit, and behoof. And the said W. H. Harrison, and Helen, his wife, party of the first part, hereby expressly waive, relinquish, release, and convey unto the said party of the second part, his heirs, executors, administrators, and assigns, all right, title, claim, interest, and benefit whatever, in and to the above described premises, and each and every part thereof, which is given by or results from all laws of this State pertaining to the exemption of homesteads.

PROVIDED ALWAYS, and these presents are upon this express condition, that if the said party of the first part, their heirs, executors, or administrators, shall well and truly pay, or cause to be paid, to the said party of the second part, his heirs, executors, administrators, or assigns, the aforesaid sums of money, with such interest thereon, at the time and in the manner specified in the above mentioned promissory notes, according to the true intent and meaning thereof, then, in that case, these presents and everything herein expressed, shall be absolutely null and void.

IN WITNESS WHEREOF, the said party of the first part hereunto set their hands and seals the day and year first above written.

W. H. HARRISON. [L. S.]
HELEN HARRISON. [L. S.]

Landlords and Tenants

LEASES should be written. No particular form of words is essential, but the lease should state in the clearest manner the terms and conditions of the agreement, so that nothing may be left to dispute between the landlord and tenant. The law does not recognize verbal promises as binding. Therefore the lease must state explicitly all the covenants between the parties.

When the landlord desires to prevent his tenant from sub-letting a part or the whole of the premises, he must provide for it in the lease. A person holding a lease which does not contain this prohibition can sub-let at his pleasure.

The lease should definitely state the period for which it is given. If no time is specified the tenant can hold the property for one year, but no longer. A tenant-at-will cannot vacate the property without giving notice of his intention, nor can he be put out withou being given notice of the landlord's desire t regain possession of the property. The law in the various States are quite uniform as t the time of notice required. If the rent b payable quarterly, three months' notice mus be given. If it be payable at more frequen periods, then the notice must equal in lengt the period of the payment. If the rent i payable monthly, a month's notice is sufficient; if weekly, a week's notice will answe

A lease given for a specified time, as on year, expires at the end of that time, and th tenant may leave without giving notice, o the landlord may put him out without notice

A lease should be recorded, whether th law requires it or not. Such record binds subsequent purchaser of the property t assume all the obligations of the forme landlord as expressed in the lease, and is necessary legal form.

Form of Lease of a Farm and Buildings.

THIS AGREEMENT, Made this first day of January, 189–, between Peleg Ross, of Shawnee County, State of Kansas, party of the first part, and O. B. Scott, of the county and State aforesaid, party of the second part,

WITNESSETH, That the said Peleg Ross lets, and the said O. B. Scott agrees to take and hold of him as tenant all that parcel of land, with the buildings and improvements appertaining and belonging to it, situate—

[*Here insert an accurate and careful description of the property.*]

From the first day of February next ensuing, upon the terms following, that is to say:

Said tenant shall be deemed a tenant from year to year;

That said tenant enter and take possession of said premises on the first day of February next;

That either party may determine the tenancy by a notice in writing, three months before the expiration of any year from the first day of February next preceding;

That the rent of said premises shall be five hundred dollars per annum, payable in half yearly payments on, etc., and on, etc.;

That the said tenant agrees to cause the followin repairs to be made, viz.: [*Here state the repair agreed upon*];

That said tenant on quitting the farm shall receiv such pecuniary compensation for improvements i fencing, etc., as two arbitrators (one of which arbitrators shall be nominated by each party, and i either neglect to nominate his arbitrator, the othe party may nominate both arbitrators) shall award which arbitrators shall abate according to the benefi derived by the tenant from such repairs, improvements, and additions, and take into consideratio how far, at the expiration of the tenancy, they ma be beneficial to the estate.

IN WITNESS WHEREOF, The said parties hav hereunto set their hands and seals the day an year first above written.

PELEG ROSS. [SEAL.]
O. B. SCOTT. [SEAL.]

Last Wills and Testaments

ANY one may make a will who is of legal age and sound mind. A married woman cannot, however, make a will unless the law of the State in which her property is situated vests her with the separate ownership of it.

The legal age for making a will devising real estate is twenty-one years. In most of the States a male, aged eighteen years, or a female, aged sixteen years, may bequeath personal property by will.

The person making a will, if a male, is called the testator; if a female, the testatrix.

A will is of no effect during the life of the maker, and may be set aside, altered or replaced by a new will, at any time previous to the death of the maker.

The *last will* made annuls all previous wills. It is, therefore, the duty of the testator to state distinctly in the first part that this is his last will. If he has made other wills, he should state that by this instrument he revokes all other wills.

The will should close with a formal statement that it is the deliberate act of the testator, and that it is properly signed and sealed by him.

All wills must be witnessed. This is a very important part of making a will, and should be performed in strict accordance with the laws of the State in which it is made. Some of the States require two, and some three credible witnesses. It is a good plan for the testator to have the will witnessed by *three* persons, in all cases, whether the law requires it or not.

The witnesses to a will should *see* the testator sign it. He should perform the act in their presence. If the testator cannot write, or is too feeble by reason of old age or sickness to do so, he may make his mark in the presence of the witnesses.

Where a will is made, and the testator subsequently disposes of any or all the property described in the will, the will is invalidated to the extent of the alienation of the property.

Where a man makes a will, and subsequently marries and has children, the law regards the will as revoked, unless the testator, after such acts, makes a new will confirming the original one.

A person cannot be an executor to a will if at the time of the probate of the will he is a minor, a drunkard, a convict, or of unsound mind.

Wills are of two kinds, written and verbal or nuncupative.

A codicil is an addition to a will designed to modify or add new provisions to a will. It does not revoke the will. Though there can be but one will, there may be any number of codicils.

A will made by a single woman is revoked by her subsequent marriage. By the terms of her marriage settlement she may, however, provide for the right to dispose of her property.

A wife cannot be deprived of her dower by any will of her husband. A husband may, however, bequeath to his wife a certain sum in lieu of her dower.

General Form of Will.

I, Thomas Henry Howard, of the City of Baltimore, State of Maryland, declare this to be my last will and testament.

1. I give and bequeath to my wife, Catharine Howard, all the fixtures, prints, books, paintings, linen, china, household goods, furniture, chattels, and effects, other than money, or securities for money, which shall, at my death, be in or about my

house, No. 458 Park avenue, in the said City of Baltimore.

2. I also give and bequeath unto my said wife, the sum of fifty thousand dollars in the preferred stock of the Baltimore & Ohio Railroad Company, now held by me.

3. I give and devise to my son, George Frederick Howard, his heirs and assigns, forever, all that certain brick dwelling and lot of ground, known as Number 529, in St. Paul street, in the said City of Baltimore, together with all the hereditaments and appurtenances thereto belonging, or in anywise appertaining; to have and to hold the premises above described to the said George Frederick Howard, his heirs and assigns, forever.

4. I give and bequeath to my said son, George Frederick Howard, the sum of one hundred thousand dollars, in the bonds of the United States of America, known as the five-twenty bonds, being all the securities of the United States now held by me.

5. I also bequeath to each of my domestic servants who may be living with me at the time of my death, the sum of two hundred dollars.

6. All the rest, residue, and remainder of my real and personal estate, I give, devise, and bequeath in equal shares, to my said wife, Catharine Howard, and to my son, George Frederick Howard, their heirs and assigns forever.

7. I appoint my said son and my said friend, Alfred W. Lee, executors of this my will, and desire that they shall not be required to give any security for the performance of their duties.

In Witness Whereof, I, Thomas Henry Howard, have hereunto set my hand and seal this twenty-fifth day of May, 189-.

THOMAS HENRY HOWARD. [seal.]

ENCYCLOPEDIA
OF
VALUABLE INFORMATION

Curiosities of the Bible.

The Bible contains 3,566,480 letters, 773,746 words 31,173 verses, 1,189 chapters, and 66 books. The word "and" occurs 46,277 times. The word "Lord" occurs 1,855 times. The word "reverend" occurs but once, which is in the 9th verse of the 111th Psalm. The middle verse is the 8th verse of the 118th Psalm. The 21st verse of the 7th chapter of Ezra contains all the letters of the alphabet except the letter J. The 19th chapter of II Kings and the 37th chapter of Isaiah are alike. The longest verse is the 9th verse of the 8th chapter of Esther. The shortest verse is the 35th verse of the 11th chapter of St. John. There are no words or names of more than six syllables. In the original Hebrew manuscripts of the Old Testament a division of the matter into paragraphs was early introduced for the convenience in reading. Larger divisions into sections suitable for Sabbath readings were made about the middle of the fifteenth century. The gospels were divided into sections for a similar purpose as early as the third century. The present arrangement of the Scriptures into chapters, however, originated in the thirteenth century with Cardinal Hugo, who devised it while making a Latin concordance. The division into verses was introduced by the celebrated printer, Robert Stephens, in his Greek Testament (1551), and in his Latin Bible (1556–7).

Originals of the New Testament.

The New Testament was originally written in Greek. It is not claimed that any of the manuscripts written by the Apostles themselves are in existence.

The Bible Printed in 300 Tongues.

The British and Foreign Bible Society reports that the sacred Scriptures were last year translated into six fresh languages. The number of tongues in which this society now publishes the Bible is thus increased to 300. Fifty years ago it was published in 150 tongues. The society distributed four million two hundred and six thousand volumes during the year.

Valuable Bibles.

A copy of the Mazarin Bible was recently sold at auction in London, and brought an even $10,000. This is the fourth of these volumes which has been sold inside of sixteen years, and the price it brought was also lower than those of the other three. One sold for $19,500, another for $13,450, and the other for $13,250. This edition of the Bible was the work of Gutenberg and Faust, and was the first book ever printed with movable types. As an artistic production, it is claimed to have never been surpassed.

The Roman Catholic Bible.

The translations of the Bible by the Protestants at the Reformation was soon followed by translation at the hands of Roman Catholic scholars, intended for those who still adhered to the Roman Church. Accordingly the New Testament appeared at Rheims, in France, in 1582; and the Old Testament appeared at Douai in 1609–10, although it had been prepared before the New Testament. The first complete edition of the entire Bible, according to this recension was published at Rouen in 1633–35. Says Dr. Schaff: "Its translators were good scholars, but were obliged to take the Latin Vulgate as the basis, and to adhere closely to it." A revision was made about the middle of the last century.

Discoveries and Settling of Countries.

America discovered by Columbus, October 11, 1492.

Andreanoffsy Isles, between Asia and America, discovered 1760.

Angola settled by Portugal, 1482.

Anguilla, in the Caribbees, first planted by England, 1650.

Antigua settled by the English, 1632.

Archangel, passage to, discovered, 1553.

Aruba Isle, planted by Holland, 1634.

Azores Isles discovered by Portugal, 1419.

Baffin's Bay discovered, 1622.

Bahama Isles, discovered, 1659; taken possession of by the English, December, 1718.

Barbadoes discovered and planted, 1614.

Barbuda Isle first planted by England, 1628.

Barrington Isle one of the Gallapagos, explored, June, 1793.

Batavia, in the Island of Java, first fortified by Holland, 1618.

Bermuda Isles discovered, 1527 ; settled, 1612.

Boston, Mass., built, 1630.

Botany Bay settlement first sailed from England, March 21, 1787.

Bourbon (formerly Mascareen) Isle planted by France, 1672.

Brazil discovered, 1486 ; settled by the Spaniards, 1515 ; settled by Holland, 1624 ; taken from Holland by Portugal, 1654.

Britain discovered to be an island about 90.

Caledonia, in America, settled, 1699.

California discovered by Cortez, 1543.

Canada discovered by Cabot, 1499 ; explored by the French, 1508, 1524 and 1534 ; settled, 1540 ; Quebec built, 1603 ; taken first by England, 1628.

Canary Isles discovered, 1344, and granted Spain ; explored, 1393.

Cape Blanco, on the coast of Africa, discovered, 1441.

Cape Breton discovered by the English, 1584 ; yielded to France, 1632 ; taken by England, 1745 ; restored, 1748 ; again taken and kept, 1758.

Cape de Verd Islands discovered, 1447.

Cape of Good Hope discovered, 1487 ; planted by Holland, 1651.

Cape Horn first sailed round, 1616.

Carolina discovered, 1497 , planted, 1629.

Caribbee Isles discovered, 1595.

Cat Isle, one of the Bahamas, the first discovery in America by Columbus, 1492.

Cayenne Isle first planted by France, 1635.

Ceylon, the Isle of, discovered, 1506.

Chatham Isle, one of the Gallapagos, explored, June, 1793.

Chili discovered by Spain, 1518 ; invaded by the Spaniards, 1540.

China first visited by the Portuguese, 1517 ; conquered by the Eastern Tartars, 1635.

Christopher's, St., Isle of, discovered, 1595 ; settled by the English, 1626.

Congou Kingdom discovered, 1482 ; settled by Portugal, 1486.

Crimea settled by Russia, 1784.

Cuba discovered, 1492 ; settled in 1511.

Curacoa settled by the Dutch, 1634.

Darien settled, 1700.

Davis' Straits discovered, 1586.

De la Plate, river, discovered, 1512.

Deseada Isle was discovered by Columbus, 1494.

Domingo, St., Isle of, discovered, 1492 ; city founded, 1494.

Dominica discovered by Columbus, November 1493.

Easter Isle discovered, 1722.

East Indies discovered by the Portuguese, 1497 ; v ited overland by some English, 1591 ; first Dut voyage, 1595 ; first voyage of the English compan 1601 ; first from France, 1601 ; first voyage of the Dan 1612.

Faulkland, Isles of, discovered, 1592.

Florida discovered by Cabot, 1500 ; settled in 1763.

Frobisher's Straits discovered, 1578.

Fox Island, in North Pacific Ocean, discovere 1760.

Galapagos Isles discovered, 1700 ; explored by Ca tain James Colnett, 1793.

Georgia colony erected by General Oglethorpe, 17

Goree Isle, on the Guinea Coast, first planted by t Dutch, 1617.

Granada Isle settled by France, 1652.

Greenland was discovered in 1585 ; settled, 17 1731.

Guadaloupe Isle discovered by Columbus, 149 planted by France, 1635.

Guinea Coast discovered by the Portuguese, 148 slave trade commenced here by Captain Hawkins Englishman, 1563.

Helena, St., discovered, 1502 ; first possessed England, 1600 ; settled by the English, 1651.

Hood's Isle, one of the Galapagos, in the Paci Ocean, explored, June, 1793.

Hudson Bay discovered by Captain Hudson, 1607.

Iceland discovered by a Danish pirate in 860.

Jamaica discovered by Columbus, 1494 ; settled the Spaniards, 1509.

Japan discovered, 1542 ; visited by the English, 161

Kamtschatka discovered by the Russians, 1739.

Ladrone Isles discovered, 1521.

Le Roach Island, near Faulkland's Island, disco ered, 1657.

Louisiana, west of the Mississippi, discovered the French, 1633 ; settled by them, 1718 ; ceded to t United States, 1801.

Madagascar discovered by the Portuguese, 1506.

Madeira, Island of, discovered, 1344 and 1418.

Magellan, Straits of, discovered, 1520.

Marigalante Isle discovered, 1493.

Maryland planted by Lord Baltimore, at the expen of £40,000, 1633.

Mauritius Isle discovered, 1598 ; settled in 1721.

Mexico conquered by the Spaniards under Corte 1519-21.

Montreal discovered, 1534 ; settled, 1629.

Montserrat, in the West Indies, discovered by C umbus, 1493 ; planted by England, 1632.

Nevis planted by England, 1628.

New Caledonia discovered, 1774.

New England planted by the Puritans, 1620.

Newfoundland discovered by Cabot, 1497; settled, 4.

New Guinea discovered, 1699.

New Holland discovered by the Dutch, 1627; settled the English, 1787.

New Jersey planted by the Swedes, 1637.

ew Spain or Mexico, discovered, 1518.

New Zealand discovered, 1660; explored in 1769.

New Plymouth built and settled, 1620.

New York settled, 1664.

North-East passage to Russia discovered, 1553.

Nova Scotia settled, 1622.

Nova Zembla discovered, 1553.

taheite, or George III's Island, discovered June 18, 5.

why-he Island discovered, 1778; where Captain k was killed.

almyra, ruins of in the Deserts of Syria, discovl, 1678.

anama settled, 1516.

araguay discovered, 1525.

ennsylvania, Penn's charter for planting, 1680.

eru discovered, 1518.

hilippine Isles discovered by the Spaniards, 1521.

itt's Straits in the West Indies, discovered, April 1760.

orto Rico discovered, 1497.

aba planted by the Dutch, 1640.

alem, Mass., settled, 1628.

andwich Islands, in the Pacific Ocean, discovered, .

avannah settled, 1732.

ierra Leone Coast discovered, 1460.

ociety Isles, in the Pacific Ocean, discovered, 1765.

olomon Isles, in America, discovered, 1527.

omer's Isles discovered, 1527.

. Eustatia Isle settled by Holland, 1632.

. Lawrence River discovered and explored by the ch, 1508.

. Salvador, Guanihani, or Cat Island, was the land discovered in the West Indies, or America, Columbus, October 11, 1492.

uffolk Isles discovered, 1764; first produced sugar, .

urinam planted by England, 1640.

urat settled, 1603.

ate Islands, East Indies, discovered, June 29, 1795.

obago planted by the Dutch, 1642.

erceras Isles discovered by the Spaniards, 1583.

erra Firma settled by the Spaniards, 1524.

rinidad, The Isle of, discovered, 1498.

kraine settled by Russia, 1752.

irginia discovered by Sir Walter Raleigh, 1584; the ement of the first permanent colony there, 1607.

est Indies discovered by Columbus, 1492.

The Political Divisions of the World, Arranged According to Size.

	Sq miles.		Sq. miles.
Russian Empire	7,862,568	Nebraska	75,995
Chinese Empire	4,695,334	Washington	69,994
British Empire	4,419,559	Indian Territory	68,991
United States	3,578,392	Uruguay	66,716
British N. Am.	3,523,083	Missouri	65,350
Brazil	3,231,047	Florida	59,268
Australian Cont.	2,945,219	Georgia	58,000
Turkish Empire	1,917,472	Michigan	56,451
India	1,552,028	Illinois	55,410
China (proper)	1,300,000	Iowa	55,045
Argentine Repub.	826,828	Wisconsin	53,924
Mexico	773,144	Arkansas	52,198
Egypt	659,081	Alabama	50,722
Turkestan	640,516	North Carolina	50,704
Persia	562,344	Orange Free State	48,019
Bolivia	535,769	Mississippi	47,156
Peru	510,107	New York	47,000
Venezuela	368,235	Pennsylvania	46,000
U. S. of Colombia	357,179	Tunis	45,710
Tripoli	344,423	Tennessee	45,600
Morocco	259,593	Louisiana	41,346
Afghanistan	258,530	Ohio	39,964
Texas	247,356	Virginia	38,352
Austria,	240,381	Portugal	37,977
Madagascar	232,315	Kentucky	37,680
Ecuador	218,984	Maine	35,000
France	209,428	South Carolina	34,000
Spain	195,607	Indiana	33,809
California	188,981	Bavaria	29,373
Central America	178,869	West Virginia	23,000
Sweden	170,634	Servia	21,210
Beloochistan	165,830	Greece	19,353
German Empire	160,207	St. Domingo	17,826
Abyssinia	158,392	Switzerland	15,722
Dakota	152,000	Denmark	14,734
Japan	149,399	Netherlands	12,680
Montana	143,776	Belgium	11,373
Prussia	135,806	Maryland	1[illegible],124
Chili	132,624	Vermont	10,212
Paraguay	126,352	Hayti	10,205
New Mexico	121,201	Liberia	9,567
Great Britain	121,115	New Hampshire	9,280
Norway	120,295	Fejee Islands	8,033
Arizona	113,916	Massachusetts	7,800
Nevada	112,090	Sandwich Islands	7,633
Italy	109,837	New Jersey	7,570
Colorado	104,500	Wurtemburg	7,532
Oregon	95,274	Baden	5,912
Idaho	90,932	Saxony	5,779
Utah	88,056	Mecklenburg-Schwerin	5,190
Wyoming	88,000	Connecticut	4,674
Minnesota	83,531	Papal States	4,552
Kansas	81,318	Hesse Darmstadt	2,969
Transvaal Republic	77,964	Oldenburg	2,469

Wealth of Principal Nations.

Argen. Rep.	$1,660,000,000	Greece	$1,055,000,000
Australia	4,950,000,000	Holland	4,935,000,000
Austria	18,060,000,000	Italy	12,755,000,000
Belgium	4,030,000,000	Mexico	3,190,000,000
Canada	3,250,000,000	Norway	1,410,000,000
Denmark	1,830,000,000	Portugal	1,855,000,000
France	40,300,000,000	Spain	7,965,000,000
Germany	31,615,000,000	Sweden	3,475,000,000
		Switzerland	1,620,000,000
Great Britain and Ireland	43,600,000,000	U. States	47,475,000,000

Money.

Money first mentioned as a medium of commerce in the twenty-third chapter of Genesis, when Abraham purchased a field as a sepulcher for Sarah, in the year of the world 2139; first made at Argos, 894 before Christ. Silver has increased 30 times its value since the Norman conquest, viz: a pound in that age was three times the quantity what it is at present, and ten times its value in purchasing any commodity; first coined in the United States, 1652; first paper money, 1690.

Weight of a Million Dollars.

The United States gold dollar contains 25.8 troy grains. A troy pound contains 5760 troy grains, but the ordinary pound of currency, avoirdupois, weighs 7000 troy grains. Therefore $1,000,000 in United States gold coin weigh 3686.4 pounds avoirdupois. A United States standard silver dollar weighs 412.5 troy grains. $1,000,000 in United States silver coin of the present standard weigh 56,931 pounds avoirdupois, or nearly 28¼ tons.

Foundations of Fortunes.

Senator Farwell began life as a surveyor.

Cornelius Vanderbilt began life as a farmer.

Wanamaker's first salary was $1.25 a week.

A. T. Stewart made his start as a school-teacher.

Jim Keene drove a milk-wagon in a California town.

Cyrus Field began life as a clerk in a New England store.

Pulitzer once acted as stoker on a Mississippi steamboat.

"Lucky" Baldwin worked on his father's farm in Indiana.

Dave Sinton sold sugar over an Ohio counter for $1 a week.

Moses Taylor clerked in Water street, New York, at $2 a week.

George W. Childs was an errand boy for a bookseller at $4 a month.

J. C. Flood, the California millionaire, kept a saloon in San Francisco.

P. T. Barnum earned a salary as bartender in Niblo's Theatre New York.

Jay Gould canvassed Delaware County, New York, selling maps at $1.50 apiece.

C. P. Huntington sold butter and eggs for what he could get a pound and dozen.

Andrew Carnegie did his first work in a Pittsburgh telegraph office at $3 a week.

Whitelaw Reid did work as correspondent of a Cincinnati newspaper for $5 a week.

Adam Forepaugh was a butcher in Philadelphia when he decided to go into the show business.

Senator Brown made his first money by plowing his neighbor's fields with a pair of bull calves.

A Business Lesson.

Peter Cooper was one of the most successful, car and prudent business men of his time. He was stro opposed to the methods of many merchants who lau ed out into extravagant enterprises on borrowed mo for which they paid exorbitant rate of interest. following anecdote illustrates this point very forci

Once, while talking about a project with an acqu ance, the latter said he would have to borrow the m for six months, paying interest at the rate of 3 per per month.

"Why do you borrow for so short a time?" Cooper asked.

"Because the brokers will not negotiate bills longer."

"Well, if you wish," said Mr. Cooper, "I will count your note at that rate for three years."

"Are you in earnest?" asked the would-be rower.

"Certainly, I am. I will discount your note $10,000 for three years at that rate. Will you do

"Of course I will," said the merchant.

"Very well," said Mr. Cooper; "just sign this for $10,000 payable in three years, and give your ch for $800, and the transaction will be complete."

"But where is the money for me?" asked the as ished merchant.

"You don't get any money," was the reply. "Y interest for thirty-six months at three per centum month amounts to 108 per centum, or $10,800; th fore your check for $800 just makes us even."

The force of this practical illustration of the foll paying such an exorbitant price for the use of mo was such that the merchant determined never to row at such ruinous rates, and he frequently use say that nothing could have so fully convinced hir this rather humorous proposal by Mr. Cooper.

Avoid Debt.

Every man who would get on in the world sho as far as possible, avoid debt. From the very outse his career he should resolve to live within his inco however paltry it may be. The art of living easil to money is very simple—pitch your scale of living degree below your means. All the world's wisdom the subject is most tersely epitomized in the word Dickens's Micawber: "Annual income, twenty pou annual expenditure, nineteen six; result, happin Annual income, twenty pounds; annual expendit twenty pounds naught and six; result, misery." M a man dates his downfall from the day when he be borrowing money. Avoid the first obligation, for, incurred, others follow, one necessitating the oth every day the victim will get more entangled: t follow pretexts, excuses, lies, till all sense of sham lost, the whole life becomes a makeshift, and the de

In despair finally resolves to live by indirect robbery and falsehood.

Getting Rich by Small Inventions.

The New Jersey man who hit upon the idea of attaching a rubber erasing tip to the end of the lead pencil is worth $200,000.

The miner who invented a metal rivet or eyelet at each end of the mouth of coat and trowsers pockets, o resist the strain caused by the carriage of pieces of ore and heavy tools, has made more money from his etters patent than he would have made had he struck a good vein of gold-bearing quartz.

Every one has seen the metal plates that are used to protect the heels and soles of rough shoes, but every one doesn't know that within ten years the man who hit upon the idea has made $250,000.

As large a sum as was ever obtained for any invention was enjoyed by the Yankee who invented the nverted glass bell to hang over gas-jets to protect ceilings from being blackened by smoke.

The inventor of the roller skate has made $1,000,000, notwithstanding the fact that his patent had nearly expired before the value of it was ascertained in the craze for roller skating that spread over the country a few years ago.

The gimlet-pointed screw has produced more wealth han most silver mines, and the Connecticut man who first thought of putting copper tips on the toes of hildren's shoes is as well off as if he had inherited 1,000,000, for that's the amount his idea has realized or him.

The common needle threader which every one has een for sale, and which every woman owns, was a boon o needle users. The man who invented it has an ncome of $10,000 a year from his invention.

A minister in England made $50,000 by inventing an dd toy that danced by winding it with a string.

The man who invented the return ball, an ordinary wooden ball with a rubber string attached to pull it ack, made $1,000,000 from it.

Results of Saving Small Amounts of Money.

The following shows how easy it is to accumulate a ortune, provided proper steps are taken. The table hows what would be the result at the end of fifty ears by saving a certain amount each day and putting t at interest at the rate of six per cent.:

Daily Savings.	The result.	Daily Savings.	The result.
One cent..................	$ 950	Sixty cents	$57,024
Ten cents..............	9,504	Seventy cents........	66,528
Twenty cents........	19,006	Eighty cents.........	76,032
Thirty cents	28,512	Ninety cents.........	85,537
Forty cents...........	38,015	One dollar.............	95,041
Fifty cents............	47,520	Five dollars...........	475,208

Nearly every person wastes enough in twenty or hirty years, which, if saved and carefully invested, would make a family quite independent; but the principle of small savings has been lost sight of in the general desire to become wealthy.

What a Dollar Saved Each Day Will Earn.

One dollar per day saved in the cost of fuel amounts, with interest, on basis of 312 working days in a year, to following:

	Four Per Cent.	Six Per Cent.	Eight Per Cent.	Ten Per Cent.
One Year........	$324 48	$330 72	$336 96	$343 20
Five Years......	1,757 50	1,864 20	1,976 80	2,095 26
Ten Years.......	3,895 76	4,359 14	4,881 40	5,469 73
Fifteen Years..	6,479 24	7,697 82	9,149 18	10,904 30
Twenty Years..	9,662 39	12,165 72	15,419 94	19,65[illegible]

Value of Metals.

Fully ninety-nine persons in every hundred, if asked to name the most precious metals, would mention gold as first, platinum as second, silver as third. If asked to name others a few might add nickel, and a very few aluminum to the list.

Let us see how near the truth they would be. Gold is worth about $240 per pound, troy; platinum $130, and silver about $12. Nickel would be quoted at about 60 cents and pure aluminum $8 to $9 to the troy pound.

We will now compare these prices with those of the rarer and less well known of the metals. To take them in alphabetical order, barium sells for $975 a pound; when it is sold at all, and calcium is worth $1,800 a pound, while cerium is a shade higher—its cost is $160 an ounce, or $1,920 a pound. Chromium brings $200; cobalt falls to about half the price of silver, while didymium is the same price as cerium, and cerium $10 cheaper on the ounce than calcium, or just $1,680 per pound.

If the wealth of the Vanderbilts be not overestimated, it amounts to nearly $200,000,000. With this sum they could purchase 312 tons of gold and have something left over, but they couldn't buy two tons of gallium, that rare metal being worth $4,250 an ounce. With this metal the highest price is reached, and it may well be called the rarest and most precious of metals.

Glucinum is worth $250 per ounce; indium, $158; irinium, $658 per pound; lanthanium, $175, and linthium, $160 per ounce. Niobium costs $128 per ounce; asmium, paladium, platinum, potassium and rhodium bring respectively, $640, $400, $39, $32 and $512 per pound. Strontium costs $128 an ounce; tantium, $144; tellurium, $9; athorium, $272; vanadium, $320; vitrium, $144, and ziconium, $250 an ounce.

Barium is more than four times as valuable as gold, and gallium more than 162 times as costly, while many of the metals are twice and thrice as valuable.

Aluminum, which now costs $8 to $9 a pound, will eventually be produced as cheap as steel.

Lightning conductors afford protection over a circle whose radius equals their height from the ground; formerly considered twice.

Average Annual Rainfall in the United States.

PLACE	Inches.	PLACE.	Inches.
Neah Bay, Wash. Ter...	123	Hanover, N. H............	40
Sitka, Alaska..............	83	Ft. Vancouver..............	38
Ft. Haskins, Oregon...	66	Cleveland, Ohio............	37
Mt. Vernon, Alabama..	66	Pittsburgh, Pa..............	37
Baton Rouge, La.........	60	Washington, D. C.........	37
Meadow Valley, Cal....	57	White Sulph'r Spgs., Va.	37
Ft. Tonson, Indian Ter.	57	Ft. Gibson, Indian Ter..	36
Ft. Myers, Florida......	56	Key West, Florida........	36
Washington, Arkansas.	54	Peoria, Illinois..............	35
Huntsville, Alabama...	54	Burlington, Vermont....	34
Natchez, Mississippi....	53	Buffalo, New York........	33
New Orleans, La.........	51	Ft. Brown, Texas.........	33
Savannah, Georgia......	48	Ft. Leavenworth, Kan...	31
Springdale, Kentucky..	48	Detroit, Michigan.........	30
Fortress Monroe, Va...	47	Milwaukee, Wisconsin..	30
Memphis, Tennessee...	45	Penn Yan, New York...	28
Newark, New Jersey...	44	Ft. Kearney.................	25
Boston, Massachusetts..	44	Ft. Snelling, Minnesota	25
Brunswick, Maine......	44	Salt Lake City, Utah Ter.	23
Cincinnati, Ohio.........	44	Mackinac, Michigan.....	23
New Haven, Conn......	44	San Francisco, Cal.........	21
Philadelphia, Pa.........	44	Dallas, Oregon.............	21
Charleston, S. Carolina	43	Sacramento, California..	21
New York City, N. Y..	43	Ft. Massachusetts, Col.	17
Gaston, N. Carolina.....	43	Ft. Marcy, New Mex. T.	16
Richmond, Indiana.....	43	Ft. Randall, Dakota T...	16
Marietta, Ohio............	43	Ft. Defiance, Arizona....	14
St. Louis, Missouri......	43	Ft. Craig, New Mex. T.	11
Muscatine, Iowa.........	42	San Diego, California....	9
Baltimore, Maryland...	41	Ft. Colville, Wash. Ter..	9
New Bedford, Mass......	41	Ft. Bliss, Texas...........	9
Providence, R. I.........	41	Ft. Bridger, Utah Ter...	6
Ft. Smith, Arkansas....	40	Ft. Garland, Colorado...	6

Average Annual Temperature in United States.

Place of Observation.	Average Temperature.	Place of Observation.	Average Temperature.
Tucson, Arizona...........	69	Salt Lake City, Utah.....	52
Jacksonville, Florida.....	69	Romney, West Virginia	52
New Orleans, La...........	69	Indianapolis, Indiana...	51
Austin, Texas.............	67	Leavenworth, Kansas,...	51
Mobile, Alabama...........	66	Sante Fe, New Mex. Ter.	51
Jackson, Mississippi......	64	Steilacoom, W. Ter......	51
Little Rock, Arkansas...	63	Hartford, Connecticut...	50
Columbia, S. Carolina...	62	Springfield, Illinois......	50
Ft. Gibson, Indian Ter..	60	Camp Scott, Nevada......	50
Raleigh, North Carolina	59	Des Moines, Iowa.........	49
Atlanta, Georgia...........	58	Omaha, Nebraska.........	49
Nashville, Tennessee.....	58	Denver, Colorado.........	48
Richmond, Virginia......	57	Boston, Massachusetts...	48
Louisville, Kentucky....	56	Albany, New York........	48
San Francisco, Cal........	55	Providence, R. I...........	48
Washington, D. C.........	55	Detroit, Michigan.........	47
St. Louis, Missouri.......	55	Ft. Randall, Dakota Ter.	47
Baltimore, Maryland.....	54	Sitka, Alaska...............	46
Harrisburg, Pa.............	54	Concord, N. H..............	46
Wilmington, Delaware..	53	Augusta, Maine............	45
Trenton, New Jersey.....	53	Madison, Wisconsin......	45
Columbus, Ohio...........	53	Helena, Montana Ter...	43
Portland, Oregon.........	53	Montpelier, Vermont....	43
Ft. Boise, Idaho...........	52	St. Paul, Minnesota......	42

The Derivations of the Names of th Months.

JANUARY.—The Roman Janus presided over the beginning of everything; hence the first month of th year was called after him.

FEBRUARY.—The Roman festival Februs was hel on the 15th day of this month, in honor of Lupercus the god of fertility.

MARCH.—Named from the Roman god of wa Mars.

APRIL.—Latin, Aprilis, probably derived fro aperire, to open; because spring generally begins an the buds open in this month.

MAY.—Latin, Maius, probably derived from Maia, femine divinity worshiped at Rome on the first day this month.

JUNE.—Juno, a Roman divinity worshiped as th Queen of Heaven.

JULY (Julius).—Julius Cæsar was born in thi month.

AUGUST.—Named by the Emperor Augustus Cæsa B. C. 30, after himself, as he regarded it a fortunat month, being that in which he had gained several vi tories.

SEPTEMBER.—Latin, septem or 7. September w the seventh month in the old Roman calendar.

OCTOBER.—Latin, octo. Eighth month of the ol Roman year.

NOVEMBER.—Latin, novem, or 9. November w the ninth month in the old Roman year.

DECEMBER.—Latin, decem, or 10. December w the tenth month of the early Roman year. About t 21st of this month the sun enters the Tropic of Capr corn, and forms the winter solstice.

Days of the Week.

SUNDAY.—Saxon, Sunnandæg, day of the sun.

MONDAY.—German, Montag, day of the moon.

TUESDAY.—Ang-Saxon, Tiwesdæg, from Tw, the g of war.

WEDNESDAY.—Ang-Saxon, Wodnesdæg, from Odi the god of storms.

THURSDAY.—Danish, Thor, the god of thunder.

FRIDAY.—Saxon, Frigedæg, day of Freya, godde of marriage.

SATURDAY.—Day of Saturn, the god of time.

The names of the seven days of the week originat with the Egyptian astronomers. They gave them t names of the sun, moon and five planets: viz., Ma Mercury, Jupiter, Venus and Saturn.

The Chinese and Thibetans have a week of five day named after iron, wood, water, feathers and earth.

Principal Exports of Various Countries.

ARABIA.—Coffee, aloes, myrrh, frankincense, g arabic.

BELGIUM.—Grain, flax, hops, woolens, linens, laces, various manufactures.

BRAZIL.—Cotton, sugar, coffee, tobacco, gold, diamonds, wheat and dry-goods.

CANADA, NOVA SCOTIA AND NEW BRUNSWICK.—Flour, furs, lumber, fish.

CAPE COLONY.—Brandy, wine, ostrich feathers, hides, tallow.

CENTRAL AMERICA.—Logwood, mahogany, indigo, cocoa.

CHILI.—Silver, gold, copper, wheat, hemp, hides, sugar, cotton, fruits.

CHINA.—Tea, silks, nankeens, porcelain, opium, articles of ivory and pearl.

DENMARK.—Grain, horses, cattle, beef, pork, butter, cheese.

EASTERN, WESTERN AND SOUTHERN AFRICA.—Gold, ivory, ostrich feathers.

EGYPT.—Rice, grain, linseed, fruits, indigo, cotton, sugar.

ECUADOR AND NEW GRENADA.—Coffee, cotton, indigo, cocoa, fruits, sugar.

FRANCE—Silks, woolens, linens, cotton, wine, brandy, porcelain, toys.

GERMANY.—Linen, grain, various manufactures of silver, copper, etc.

GREAT BRITAIN.—Woolens, cottons, linens, hardware, porcelain, etc.

GREENLAND.—Whale oil, whale bone, seal skins.

HINDOOSTAN.—Cotton, silks, rice, sugar, coffee, opium, indigo.

HOLLAND.—Fine linens, woolens, butter, cheese, various manufactures.

ITALY.—Silks, wine, oil, grain, fruits.

IRELAND.—Linens, beef, butter, tallow, hides, potatoes, barley.

JAPAN.—Silk and cotton goods, japanware, porcelain.

MEXICO.—Gold, silver, logwood, cochineal, fruits.

PERSIA.—Carpets, shawls, wine, silk, cotton, rice, rhubarb, guns, swords, etc.

PERU.—Silver, gold, Peruvian bark, mercury, sugar, cotton, fruits.

RUSSIA.—Hemp, iron, linen, grain, timber, furs, tallow, platina.

SPAIN AND PORTUGAL.—Silks, wool, wine, oil, fruits, salt.

SWEDEN AND NORWAY.—Iron, steel, copper, timber, fish.

SWITZERLAND.—Watches, jewelry, paper, laces, linen, cotton and silk goods, etc.

TURKEY.—Grain, fruits, cotton, oil, wines, carpets, muslin, swords.

UNITED STATES.—

Eastern States.—Lumber, beef, pork, fish, cottons, woolens, etc.

Middle States.—Flour, wheat, salt, coal, cottons, woolens.

Southern States.—Cotton, rice, tobacco, corn, lumber, pitch, fruits.

Western States.—Corn, wheat, lead, coal, iron, salt, lime, beef, pork.

VENEZUELA.—Sugar, coffee, cocoa, cotton, indigo, fruits.

WEST INDIES.—Sugar, rum, molasses, coffee, spice, cotton, indigo, fruits.

Salaries Paid to Heads of Governments.

Various governments pay their chiefs as follows: The United States, $50,000 a year; Persia, $30,000,000; Russia, $10,000,000; Siam, $10,000,000; Spain, $3,900,000; Italy, $3,000,000; Great Britain, $3,000,000; Morocco, $2,500,000; Japan, $2,300,000; Egypt, $1,575,000; Germany, $1,000,000; Saxony, $700,000; Portugal, Sweden and Brazil, each $600,000; France, $200,000; Hayti, $240,000; Switzerland, $3,000.

Sovereigns of England.

"First William the Norman;
Then William, his son,
Henry, Stephen and Henry,
Then Richard and John;
Next, Henry the third,
Edwards, one, two, three,
And again, after Richard,
Three Henrys we see.
Two Edwards, third Richard,
If rightly I guess;
Two Henrys, sixth Edward,
Queen Mary, Queen Bess,
Then Jamie, the Scotchman,
Then Charles, whom they slew,
Yet received after Cromwell
Another Charles, too;
Next James the second
Ascended the throne;
Then good William and Mary
Together came on;
'Till Annie, Georges four
And fourth William all gone;
God sent us Victoria,
Who was excelled by none,
Then Edward the seventh,
Her illustrious son."

The Smallest Republic in Europe.

The honor which was claimed for Gersau belongs to the independent hamlet of Foust. This pretty group of huts, situated a few hours distant from Oleron, in the department of the lower Pyrenees, belongs neither to France nor Spain. It has somewhat over 100 citizens. They have no mayor or other civil official. They have not even an established church or priest of their own, but attend at a neighboring village. The very weakness of this little republic preserves it in existence.

What Royalty Costs England.

As a sample of what royalty costs the people of Great Britain alone, Whitaker gives the following annuities to the royal family:

Her Majesty—		
Privy purse	£60,000	
Salaries of household	131,260	
Expenses of household	172,500	
Royal bounty, etc	13,500	
Unappropriated	8,540	
		£385,800
Prince of Wales		40,000
Princess of Wales		10,000
Prince Albert Victor		10,000
Crown Princess of Prussia		8,000
Duke of Edinburgh		25,000
Princess Christian of Schleswig-Holstein		6,000
Princess Louise (Marchioness of Lorne)		6,000
Duke of Connaught		25,000
Duke of Albany		25,000
Duke of Cambridge		6,000
Duchess of Mecklenburg-Strelitz		3,000
Duke of Cambridge		12,000
Duchess of Teck		5,000
Total....		£566,800 or $2,834,000

Carlisle Tables of Mortality.

Showing how many persons out of 10,000 will die annually, on the average until all are deceased. Used by Life Insurance Companies.

Year.	No. Alive.	Deaths.	Year.	No. Alive.	Deaths.
At Birth.	10,000	1,539	41	5,009	69
1	8,461	682	42	4,940	71
2	7,779	505	43	4,869	71
3	7,274	276	44	4,798	71
4	6,998	201	45	4,727	70
5	6,797	121	46	4,657	69
6	6.670	82	47	4,588	67
7	6,594	58	48	4,521	63
8	6,536	48	49	4,458	61
9	6,493	33	50	4,397	59
10	6,460	29	51	4,338	62
11	6,431	31	52	4,276	65
12	6,400	32	53	4,211	68
13	6,368	33	54	4,143	70
14	6,335	35	55	4,073	73
15	6,300	39	56	4,000	76
16	6,261	42	57	3,924	82
17	6,219	43	58	3,842	93
18	6,176	43	59	3,749	106
19	6,133	43	60	3,633	122
20	6,090	43	61	3,521	126
21	6,047	42	62	3,395	127
22	6,005	42	63	3,268	125
23	5,963	42	64	3,143	125
24	5,921	42	65	3,018	124
25	5,879	43	66	2,894	123
26	5,836	43	67	2,771	123
27	5,793	45	68	2,648	123
28	5,748	50	69	2,525	124
29	5,698	56	70	2,401	124
30	5,642	57	71	2,277	134
31	5,585	57	72	2,143	146
32	5,528	56	73	1,997	156
33	5,472	55	74	1,841	166
34	5,417	55	75	1,675	160
35	5,362	55	76	1,515	156
36	5,307	56	77	1,359	146
37	5,251	57	78	1,213	132
38	5,194	58	79	1,081	128
39	5,136	61	80	953	116
40	5,075	66	81	837	112

How Human Life is Spent.

According to a French statistician, taking the me of many accounts, a man of 50 years of age has sle 6,000 days, worked 6,500 days, walked 800 days, amu ed himself 4,000 days, was eating 1,500 days, was si 500 days, etc. He ate 17,000 pounds of bread, 16,0 pounds of meat, 4,600 pounds of vegetables, eggs a fish, and drank 7,000 gallons of liquid, namely, wate tea, coffee, beer, wine, etc., altogether.

How to tell the Age of any Person.

There is a good deal of amusement in the followi magical table of figures. It will enable you to tell ho old the young ladies are. Just hand this table to young lady, and request her to tell you in which co umn or columns her age is contained, and add togeth the figures at the top of the columns in which her a is found, and you have the great secret. Thus, su pose her age to be 17, you will find that number in t first and fifth columns; add the first figures of the two columns.

Here is the magic table:

1	2	4	8	16	32
3	3	5	9	17	33
5	6	6	10	18	34
7	7	7	11	19	35
9	10	12	12	20	36
11	11	13	13	21	37
13	14	14	14	22	38
15	15	15	15	23	39
17	18	20	24	24	40
19	19	21	25	25	41
21	22	22	26	26	42
23	23	23	27	27	43
25	26	28	28	28	44
27	27	29	29	29	45
29	30	30	30	30	46
31	31	31	31	31	47
33	34	36	40	48	48
35	35	37	41	49	49
37	38	38	42	50	50
39	39	39	43	51	51
41	42	44	44	52	52
43	43	45	45	53	53
45	46	46	46	54	54
47	47	47	47	55	55
49	50	52	56	56	56
51	51	53	57	57	57
53	54	54	58	58	58
55	55	55	59	59	59
57	58	60	60	60	60
59	59	61	61	61	61
61	62	62	62	62	62
63	63	63	63	63	63

Another Method of Telling Any One's Age

Girls of a marriageable age do not like to tell ho old they are, but you can find out by following sub joined instructions, the young lady doing the figurin Tell her to put down the number of the month in whic she was born; then to multiply it by two; then to ad five; then to multiply it by 50; then to add her age then to subtract 365; then to add 115; then tell her t l you the amount she has left. The two figures to e right will denote her age, and the remainder the nth of her birth. For example, the amount is 822, e is twenty-two years old, and was born in the eighth nth (August). Try it.

A Lady's Chance of Marrying

Every woman has some chance to marry; it may be e to fifty, or it may be ten to one that she will. Re-esenting her entire chance at one hundred at certain ints of her progress in time, it is found to be in the lowing ratio:

tween the ages of 15 and 20 years......14½ per cent.
tween the ages of 20 and 25 years...... 52 per cent.
tween the ages of 25 and 30 years...... 18 per cent.
tween the ages of 30 and 35 years......15½ per cent.
tween the ages of 35 and 40 years...... 3¾ per cent.
tween the ages of 40 and 45 years...... 2½ per cent.
tween the ages of 45 and 50 years...⅜ of 1 per cent.
tween the ages of 50 and 56 years...¼ of 1 per cent.

After sixty it is one-tenth of one per cent. or one nce in a thousand. A pretty slender figure—but URES are often SLENDER at that age.

Mode of Execution in Every Country.

ountry.	Mode.	Publicity.
stria	Gallows	Public.
varia	Guillotine	Private.
gium	Guillotine	Public.
nswick	Ax	Private.
ina	Sword or cord	Public.
nmark	Guillotine	Public.
iador	Musket	Public.
nce	Guillotine	Public.
eat Britain	Gallows	Private.
nover	Guillotine	Private.
y	Sword or gallows*	Public.
herlands	Gallows	Public.
enberg	Musket	Public.
tugal	Gallows	Public.
ssia	Sword	Private.
ssia	Musket, gallows, or sword	Public.
ony	Guillotine	Private.
in	Garrote	Public.
witzerland—		
een cantons	Sword	Public.
cantons	Guillotine	Public.
cantons	Guillotine	Private.
ted States (other han New York)	Gallows	Mostly Private.
York	Electricity	Private.

Capital punishment abolished in 1876.

Antidotes for Poisons.

n cases where the other articles to be used as anti-es are not in the house, give two tablespoonfuls of mustard mixed in a pint of warm water. Also give large draughts of warm milk or water mixed with oil, butter or lard. If possible give as follows.

FOR BED-BUG POISON, BLUE VITRIOL, CORROSIVE SUBLIMATE, LEAD WATER, SALTPETRE, SUGAR OF LEAD, SULPHATE OF ZINC, RED PRECIPITATE, VERMILION,	Give Milk or White of Eggs, in large quantities.
FOR FOWLER'S SOLUTION, WHITE PRECIPITATE, ARSENIC,	Give prompt Emetic of Mustard and Salt—tablespoonful of each; follow with Sweet Oil, Butter or Milk.
FOR ANTIMONIAL WINE, TARTAR EMETIC,	Drink warm water to encourage vomiting. If vomiting does not stop, give a Grain of Opium in water.
FOR OIL VITRIOL, AQUA FORTIS, BI-CARBONATE POTASSA, MURIATIC ACID, OXALIC ACID	Magnesia or Soap, dissolved in water, every two minutes.
FOR CAUSTIC SODA, CAUSTIC POTASH, VOLATILE ALKALI,	Drink freely of water with Vinegar or Lemon Juice in it.
FOR CARBOLIC ACID	Give Flour and Water or Glutinous drinks.
FOR CHLORAL HYDRATE, CHLOROFORM,	Pour cold water over the head and face, with artificial respiration, Galvanic Battery.
FOR CARBONATE OF SODA, COPPERAS, COBALT,	Prompt Emetic; Soap or Mucilaginous drinks.
FOR LAUDANUM, MORPHINE, OPIUM,	Strong Coffee, followed by Ground Mustard, or Grease in warm water to produce vomiting. Keep in motion.

FOR NITRITE OF SILVER—Give common Salt in water.

FOR STRYCHNINE, TINCT. NUX VOMICA	Emetic of Mustard or Sulphate of Zinc, aided by warm water.

Powers of Locomotion of Animals, and Average Velocities of Various Bodies.

	Per hour		Per Sec.
A man walks	3 miles,	or	4 feet.
A horse trots	7 "	or	10 "
A horse runs	20 "	or	29 "
Steamboat runs	18 "	or	26 "
Sailing vessel runs	10 "	or	14 "
Slow rivers flow	3 "	or	4 "
Rapid rivers flow	7 "	or	10 "
A moderate wind blows	7 "	or	10 "
A storm moves	36 "	or	52 "
A hurricane moves	80 "	or	117 "
A rifle ball moves	1,000 "	or	1,466 "
Sound moves	743 "	or	1,142 "
Light moves	192,000 miles per second.		
Electricity moves	288,000 miles per second.		

The Pulse.

The natural rate of the pulse varies at different ages as follows:

	Beats per Minute.
At birth	130—140
One year	115—130
Two years	100—115
Three years	95—105
Four to seven years	85— 95
Seven to fourteen years	80— 90
Fourteen to twenty-one years	75— 85
Twenty-one to sixty years	70— 75
Old age	75— 85

Periods of Digestion.

SUBSTANCE.	H.	M.
Rice, boiled	1	
Eggs, whipped, raw	1	30
Trout, fresh, fried	1	30
Soup, barley, boiled	1	30
Apples, sweet, mellow, raw	1	30
Venison steak, broiled	1	45
Sago, boiled	1	45
Tapioca, boiled	2	
Barley, boiled	2	
Milk, boiled	2	
Liver, beef, fresh, broiled	2	
Eggs, fresh, raw	2	
Apples, sour, mellow, raw	2	
Cabbage, with vinegar, raw	2	
Milk, raw	2	15
Eggs, fresh, roasted	2	15
Turkey, domestic, roasted	2	30
Goose, wild, roasted	2	30
Cake, sponge, baked	2	30
Hash, warmed	2	30
Beans, pod, boiled	2	30
Parsnips, boiled	2	30
Potatoes, Irish, baked	2	30
Cabbage, head, raw	2	30
Custard, baked	2	45
Apples, sour, hard, raw	2	50
Oysters, fresh, raw	2	55
Eggs, fresh, soft boiled	3	
Beefsteak, broiled	3	
Mutton, fresh, broiled	3	
Mutton, fresh, boiled	3	
Soup, bean, boiled	3	
Chicken soup, boiled	3	
Dumpling, apple, boiled	3	
Oysters, fresh, roasted	3	15
Pork, salted, broiled	3	15
Porksteak, broiled	3	15
Mutton, fresh, roasted	3	15
Bread, corn, baked	3	15
Carrot, orange, boiled	3	15
Sausage, fresh, broiled	3	20
Oysters, fresh, stewed		
Butter, melted		
Cheese, old, raw		
Oyster soup, boiled		
Bread, wheat, fresh, baked		
Turnips, flat, boiled		
Potatoes, Irish, boiled		
Eggs, fresh, hard boiled		
Eggs, fresh, fried		
Green corn and beans, boiled		
Beets, boiled		
Salmon, salted, boiled		
Beef, fried		
Veal, fresh, broiled		
Fowls, domestic, boiled		
Beef, old, salted, boiled		
Pork, salted, fried		
Pork, salted, boiled		
Veal, fresh, fried		
Cabbage, boiled		
Pork, roasted		
Suet, beef, boiled		

Percentage of Nutrition in Various Art le of Food.

Raw Cucumbers	2	Roast Poultry	
Raw Melons	3	Raw Beef	
Boiled Turnips	4½	Raw Grapes	
Milk	7	Raw Plums	
Cabbage	7½	Broiled Mutton	
Apples	10	Oatmeal Porridge	
Currants	10	Rye Bread	
Whipped Eggs	13	Boiled Beans	
Beets	14	Boiled Rice	
Apples	16	Barley Bread	
Peaches	20	Wheat Bread	
Boiled Codfish	21	Baked Corn Bread	
Broiled Venison	22	Boiled Barley	
Potatoes	22½	Butter	
Fried Veal	24	Boiled Peas	
Roast Pork	24	Raw Oils	

Percentage of Alcohol in Various Liqu rs

Scotch Whisky	54.53	Currant Wine	
Irish Whisky	53.9	Port	
Rum	53.68	Madeira	
Gin	51.6	Teneriffe	
Brandy	53.39	Sherry	
Burgundy	14.57	Claret	
Cape Muscat	18.25	Elder	
Champagne (still)	13.80	Ale	
Champagne (sp'rkl'g)	12.61	Porter	
Cider	5.2 to 9.8	Malaga	
Constantia	19.75	Rhenish	
Gooseberry Wine	11.48	Small Beer	

Weight of Eggs.

The following table of the weight of eggs per p of various breeds of fowls and the number of egg in a year is approximately fair, though it may under exceptionally adverse or favorable conditio

Varieties.	Eggs Per lb.	No. Eggs Per Year.
ight Brahmas	7	130
ark Brahmas	8	130
artridge Cochins	7	130
lack, White, Buff Cochins	7	120
lymouth Rocks	8	150
oudans	8	155
a Fleche	7	135
reve Cœurs	8	145
lack Spanish	8	155
eghorns	8	160
amburgs	9	150
ominiques	8	135
ames	9	140
antams	16	90

Food in an Egg.

An egg contains as much nourishment as a pound d an ounce of cherries, a pound and a quarter of apes, a pound and a half of russet apples, two pounds gooseberries and four pounds of pears; and 114 ounds of grapes, 127 pounds of russet apples, 192 ounds of pears, and 327 pounds of plums are equal nourishment to 100 pounds of potatoes.

Rules for the Management of Poultry.

1. Good dry houses, well ventilated but void of afts.

2. Keep your hen houses clean and the floor covered ith ashes.

3. Whitewash inside monthly from March 1st to ctober 1st.

4. Feed regularly, but never overfeed; cease feeding hen the fowls cease to run for it.

5. Scatter the food on the ground when the weather ill permit.

6. Feed mixed grain, or alternate, as corn one day, ts next, wheat next, etc.

7. Allow adult fowls freedom as early in the morn-g as they desire.

8. Keep hens with chicks in small coops (well cov-ed and dry) until the chicks are three weeks old.

9. Feed chicks morning, noon and afternoon.

10. Mix ground black pepper with the morning od.

11. Grease the hens well under the wings, breast and iff feathers as soon as the chicks are taken off, with ntment made of lard and carbolic acid; one table-conful of lard to ten drops of acid.

Box Measures.

Farmers and market gardeners will find a series of x measures very useful, and they can readily be made anyone who understands the two-foot rule and can ndle the saw and hammer. The following measure-ents, it will be seen, vary slightly from the United ates bushel adopted by some of the States, but are fficiently accurate for all ordinary purposes:

A box 16 by 16⅓ inches square and 8 inches deep will contain a bushel, or 2150.4 cubic inches, each inch in depth holding one gallon.

A box 24 by 11.2 inches square and 8 inches deep will also contain a bushel, or 2150.4 cubic inches, each in depth holding 1 gallon. A box 12 by 11.2 inches square and 8 inches deep will contain half a bushel, or 1075.2 cubic inches, each inch in depth holding half a gallon.

A box 8 by 8.4 inches square and 8 inches deep will contain half a peck, or 298.8 cubic inches. The gallon, dry measure.

A box 4 by 4 inches square and 4.2 inches deep will contain 1 quart, or 67.2 cubic inches.

How to Drive Flies from Stables.

Scatter chloride of lime on a board in a stable, to remove all kinds of flies, but more especially biting flies. Sprinkling beds of vegetables with even a weak solution, effectually preserves them from caterpillars, slugs, etc. A paste of one part powdered chloride of lime, and a half part of some fatty matter placed in a narrow band round the trunk of the tree, prevents insects from creeping up it. Even rats, mice, cockroaches and crickets flee from it.

How to Keep Flies from Horses.

Procure a bunch of smartweed and bruise it to cause the juice to exude. Rub the animal thoroughly with the bunch of bruised weed, especially on the legs, neck and ears. Neither flies or other insects will trouble him for twenty-four hours. The process should be repeated every day. A very convenient way of using it is, to make a strong infusion by boiling the weed a few minutes in water. When cold it can be conveniently applied with a sponge or brush. Smartweed is found growing in every section of the country, usually on wet ground near highways.

A Rule for Determining the Weight of Live Cattle by Measurement.

There are many rules for estimating the weight of cattle by measurement, but one of the authorities on the subject says that "There is no rule that comes nearer than good guessing," and that no two animals will weigh alike according to measurement. The same authority further remarks that a rule, as good as any, is to find the superficial feet by multiplying the girth, just behind the shoulder-blade, by the length from the fore part of the shoulder-blade to the root of the tail. Thus an ox girthing seven feet nine inches, and measuring six feet in length, would contain seven and three-fourths times six or 46½ superficial feet. For cattle, grass fed, the following is given as the weight per superficial foot: Girth less than 3 feet, 11 pounds; girth 3 to 5 feet, 16 pounds; girth 5 to 7 feet, 23 pounds; girth 7 to 9 feet, 31 pounds.

GOOD HEALTH AND HOW TO PRESERVE IT

The Gymnasium

IN the gymnasium we call *ground* exercises those which are performed in the upright posture, and which consist in successive movements of flexion, extension, etc., of the legs, the arms, the trunk, the pelvis, and the neck. These are evidently, from an æsthetic point of view, the best of all exercises. Every limb does work in proportion to the strength of its muscles, for it moves only its own weight.

The body being supported on the legs during these exercises, the vertebral column has no tendency to assume a vicious attitude for the maintenance of an abnormal equilibrium.

These exercises would then be the best of all if they were a little more interesting to those who practise them. But they are very unattractive, as they suppress all initiative on the part of the pupil, and only need an attentive and passive obedience to orders.

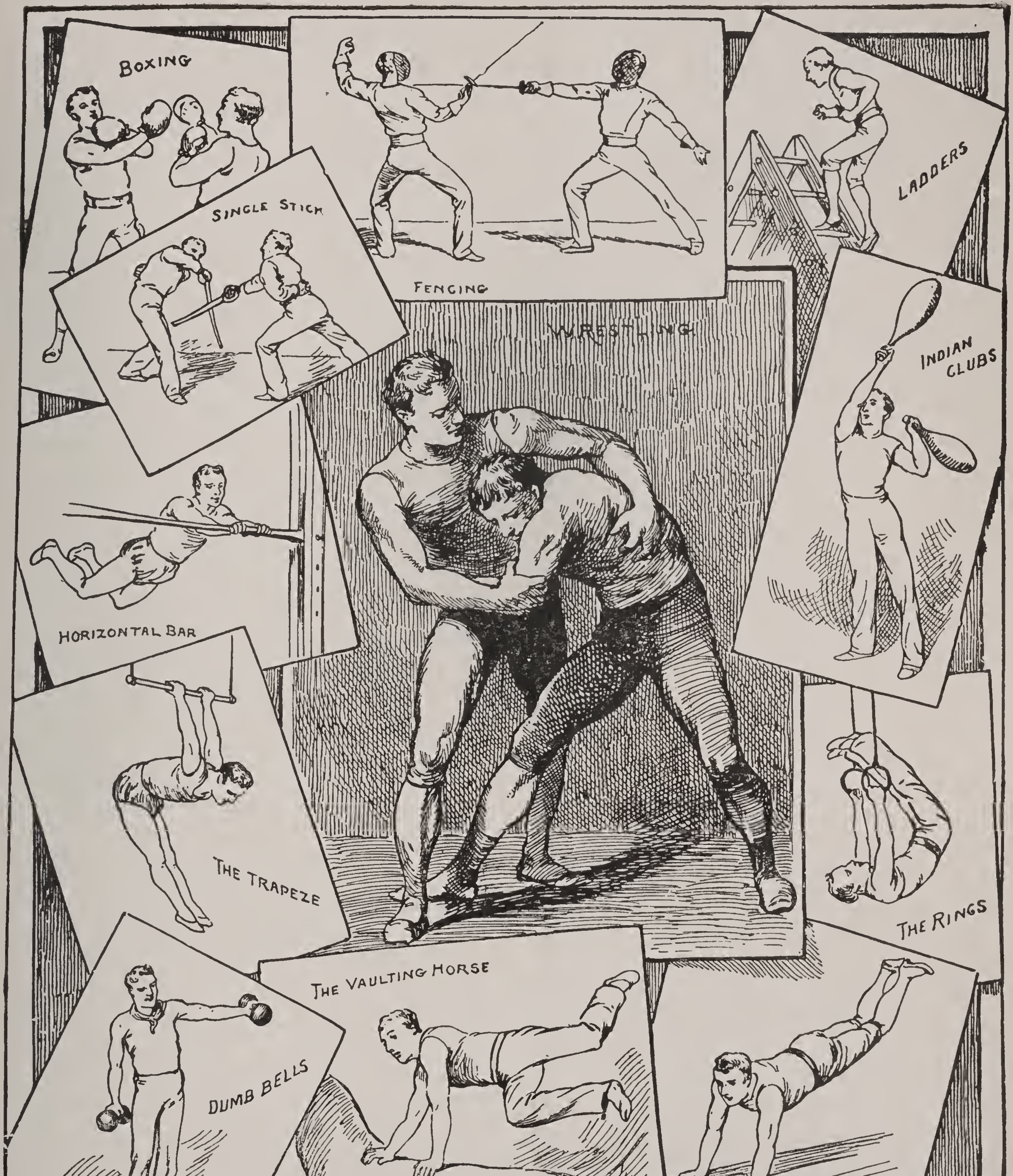
There is happily another gymnastic exercise which combines with regularity in the expenditure of force a peculiar attraction, because it implies a contest of skill, agility and readiness: this is *French boxing*. This exercise is learned in a series of lessons of which each is performed alternately by the right and the left side of the body. In this manner the right leg and the right arm repeat exactly, when their turn comes, all the movements which have just been performed by the left arm and the left leg.

French boxing, in which blows are given with the feet as well as with the fist, needs every moment attitudes of great boldness.

Rapid Movements.

When a kick has to be given as high as the face, the trunk must be strongly inclined to the side to counterbalance the displacement of the centre of gravity, and this attitude would be vicious if it were always in the same direction. But the right leg, which has delivered a kick, has hardly returned to the ground when the left leg must take its turn, and repeat the attack, either directly forwards, or by the pirouette known as the *turning kick*.

With a rapidity which astonishes the spectator, the body must change from one leg to the other with a sufficiently stable equilib-



ATHLETIC EXERCISES FOR TRAINING THE BODY.

rium to propel the foot in a precise direction with great force. In order that the centre of gravity may be displaced with such marvellous ease, the vertebral column, which plays the part of a balancing-pole, must preserve an extreme mobility.

French boxing is, then, preferable to fencing for the regular development of the body of a young man and for preventing vicious carriage.

Swimming and Climbing.

Swimming needs a regular action of all the muscles. The body must progress in this exercise by a movement of extension which, beginning in the legs, spreads to the thighs, the vertebral column and the arms.

Climbing has a great resemblance to swimming. In both these exercises progression is brought about by alternate movements of flexion and extension of the body and limbs. Between these two methods of progression there seems to be at first sight only a difference of direction; in swimming it is horizontal, in climbing from below upwards.

But there is a capital difference as regards the mechanism of the work; in the swimmer the arms and shoulder move in the same horizontal plane; in the climber, on the contrary, the arms are much in advance of the chest, and their movements of flexion, the hands being fixed, tend to draw the shoulders upwards, forwards and inwards.

In the exercise of swimming there is no cause of deformity, and swimmers have, therefore, generally a very regular development.

There are certain exercises which seem at first sight to be performed by a very localized group of muscles, but which a more attentive analysis shows to be generalized throughout the body. Thus a man who rings a heavy bell does not only work with his hands which hold the rope, but with his arms which bend, with his trunk which leans forward, even with his feet, which contract in order to adhere more firmly to the ground.

Rowing is reputed to increase the size of the biceps, and this sport is generally classed with exercises of the arms. This is a mistake, for the work of the rower is far from being localized in his upper limbs. The muscular effort which moves on the boat is largely situated in the extensors of the vertebral column. The oarsman *pulls* above all with his loins. Further, when the boat is to be propelled with great speed, as in racing, the legs work at least as much as the arms.

The Oar and Paddle.

As we are writing these lines we are suffering from an attack of muscular stiffness produced by resuming the exercise of rowing after a year's interval. In the muscles of the arms we have merely a slight sensation of discomfort, but those of the loins and thighs are really painful, having been vigorously in action.

We must make a strong distinction between exercise with the oar and that with the *paddle*. In the latter exercise the canoeist derives a fixed support from the seat, and his legs do not help him at all. They usually lie in the bottom of the boat inactive and extended.

As to the trunk, it participates in the work, not by movements of flexion and extension, but by lateral displacements, now to the right, now to the left. Further, the canoeist, when making his most powerful efforts, is not leaning backwards, like the oarsman, but curved forwards.

This position is imposed by the necessity of giving to the movement of the trunk a direction opposed to that in which the water is displaced by the motor of the boat. Now in paddling the water is displaced from before backwards, whilst in rowing it is displaced from behind forwards.

The canoeing movement is certainly very graceful. The body leans in regular rhythm to the right and to the left, and the head at each displacement is inclined in the opposite direction to the trunk, by a series of lateral inflexions of the cervical vertebræ. From these two opposed but compensatory movements, results a wave-like movement, which, added to the rapid gliding of the frail bark, forms a seductive picture.

A Curved Back.

But the canoeist's back is curved like that of the jocky, and his legs remain inactive. Hence, in our opinion, the inferiority of canoeing from the hygienic point of view. It leaves the lower limbs absolutely motionless, and it tends to produce a round back.

In rowing, the oarsman also leans forwards at intervals in order to carry his oar backwards, but this is at a stage in the exercise where no force is required and, therefore, no pressure is exercised on the vertebræ. The really energetic muscular action, the one which determines the progression of the boat, is performed by bending the body backwards; at this movement of the effort the head is high and erect, and if the movement is very powerful, the face is upturned. The really active movement in rowing consists in *extension* of the dorsal spine. No movement is more fit than this to remedy a round back.

It will be well to point out the difference between "sculling" and "rowing." In the latter case there is one oar held in both hands, which forces the oarsman to lean to the side of his oar. In sculling there is needed an equal and symmetrical effort of both hands. Hence, to preserve the straightness of the body, sculling is much superior to rowing.

We cannot review here all the exercises which are able to favor regular development. But we should like to try to define certain points which must be kept in mind when we wish to appreciate the influence of movements on bodily form.

Wrong Modes of Exercise.

First, the body left to itself, without being subjected to any external influence capable of producing deformity, tends naturally to develop in a regular direction. The causes which tend to produce deviation may be of internal orgin, such as affections of bones or joints, retractions of tendons or of muscles, and paralysis.

But the most common deformities arise from external causes, such as pressures, shocks, works or habits leading to a vicious carriage. Amongst the external agents capable of producing bodily deformity, ill-chosen or ill-directed exercise is a very frequent cause.

The vertebral column is the axis of the body. When it is normal in direction, the body is upright and the attitude is elegant. Most of the deviations of the spine have a muscular source, and arise from the predominant action of the muscles which draw the vertebræ in a given direction over those which should balance the action of these by drawing the spine in the opposite direction.

Muscular exercise tends to develop the muscles and the bones; it is enough that this development should be regular, that no region of the body should acquire an exaggerated size capable of destroying harmony of proportion, and that no portion of the skeleton should assume a vicious direction.

Neglect of all exercise sometimes coincides with deviations of the body, but these are almost always due to a habitually vicious carriage, such as is observed in persons of sedentary life. The schoolboy kept in class from morning till evening, the artisan kept all day in the workshop, often present deviations of the figure; but the vicious position of the body needed for writing is the true cause of the lateral curvature of the spine which is common in school-children; similarly it is to the bent attitude when working with the needle that we must attribute the round back so common to tailors.

SPORT IN THE GYMNASIUM.

When muscular force is completely removed, as for instance in the dead body, there is a tendency to fall forwards; and if the dead body, held upright, is supported by the waist, we see the head lean down towards the chest, the shoulders fall forwards, and the back arched by an exaggerated flexion of the spine.

This stooping attitude, due to complete absence of muscular action, is an exaggeration of that observed in persons whose muscles are extremely enfeebled by inaction.

The round back is in these persons always accompanied by a receding chest, first because muscular inaction leads to diminution in the size of the thorax; secondly, because in a side view of the body, very pronounced convexity of the back tends by comparison to cause the line of the sternum to appear flat, and even concave. We observe this characteristic deformity in all cases in which young persons have led too sedentary a life, deprived of air and movement.

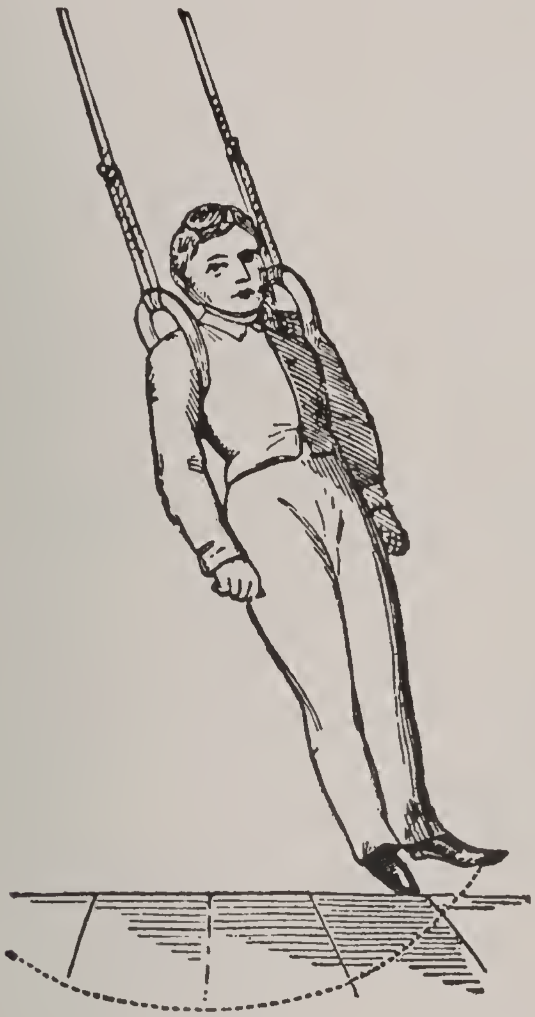


FIGURE 1.

Muscular exercise, in whatever form, gives marvellous results in these deformities in which we cannot properly speak of a deviation to be remedied, but rather of a weakened part to be supported. The vertebral column promptly finds energetic support from the spinal muscles as soon as a man begins to perform violent movements, for every work needing a certain expenditure of force demands action from these muscles for the purpose of fixing the vertebral column, the centre and pivot in all movements of the trunk and limbs.

But aside from these cases of excessive debility, it is not from increased strength of the muscles that we must demand the means of restoring perfect uprightness to the figure. The persons who are most remarkable for elegance and grace are often very *supple* rather than very vigorous.

Suppleness of figure comes from the great ease with which the vertebræ can glide in all directions over each other. From this great mobility results the facility with which the various pieces of the dorsal spine accommodate themselves to the different attitudes of the body, and to the rapidity with which the trunk is balanced in all the displacements which it undergoes. So that the greatest possible grace of figure may be observed in clowns.

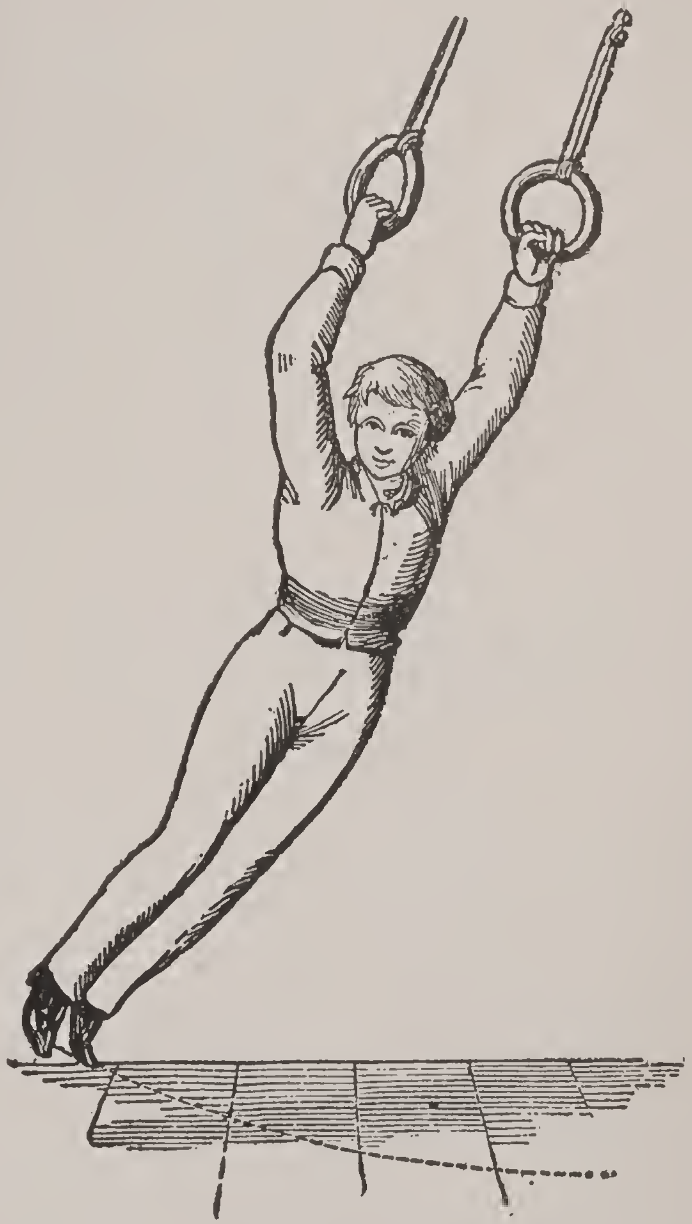


FIGURE 2.

Certain exercises which demand very slight expenditure of muscular force have a remarkable tendency to make the back very straight: these are exercises which need balancing. A rope-dancer cannot keep upright on his slender support if he allows the axis of his body to fall out of the vertical, and this axis is represented by the vertebral column.

All the movements of the acrobat tend to give to the muscles which move the vertebræ the degree of contraction necessary that the bony rod they form should have a perfectly vertical direction.

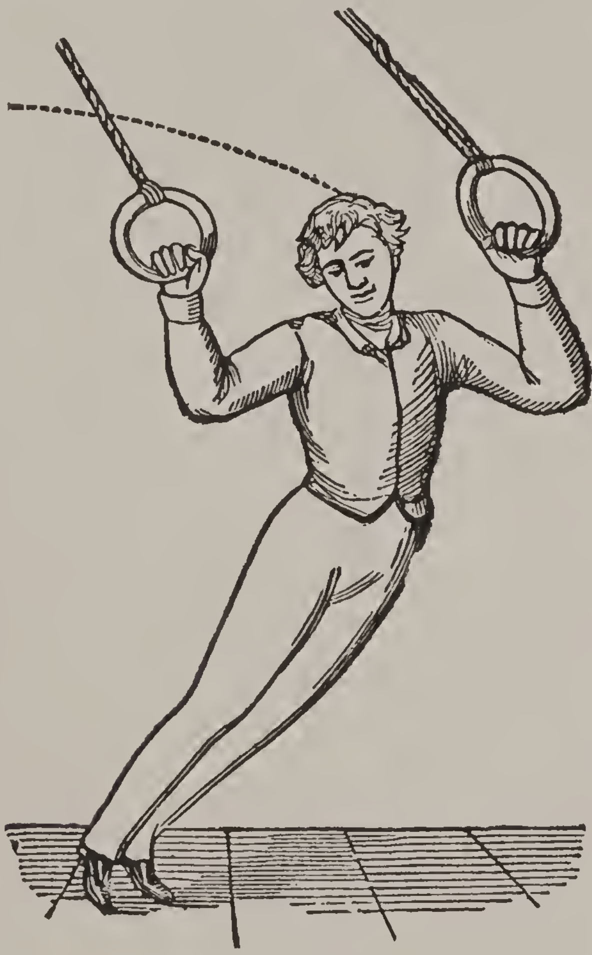


FIGURE 3.

The rope-dancer preserves when on the ground the position which his well-disciplined muscles are accustomed to give to the bones on which they act.

Balancing jugglers are, like rope-dancers and *India-rubber men*, types of perfect physical straightness; and if we compare them, in the circus, to the gymnasts whose specialty is the trapeze, we are struck by the superiority of the former in elegance of figure.

We have seen nothing more charming than a little balancing girl who, at the circus, climbed to the top of a pyramid built of bottles, and poised herself like a bird on the neck of the highest without displacing any of them. It was marvellous to see the child when she had built the fragile structure, first make sure of the balance standing upright, then, putting her foot on its frail support raise herself, holding in her hand the neck of the last bottle, without the trunk deviating from the vertical by a hair's breadth.

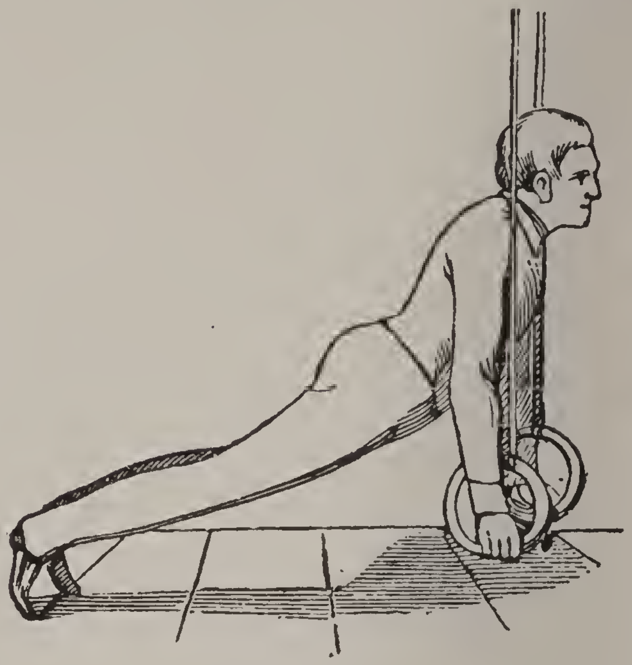


FIGURE 4.

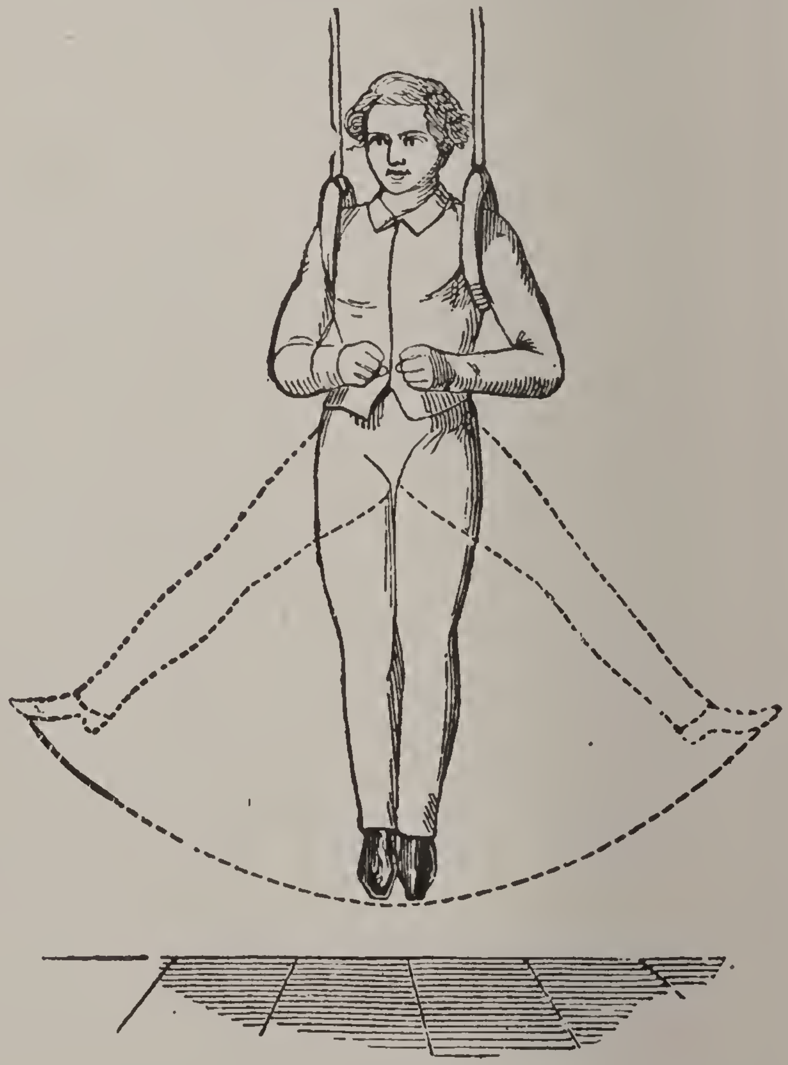


FIGURE 5.

It was then necessary, from the stooping posture, to gain the upright one, and it was only by a mathematical precision in the contraction of the vertebral muscles that the extension of the legs and thighs could be ffected without upsetting the whole structure.

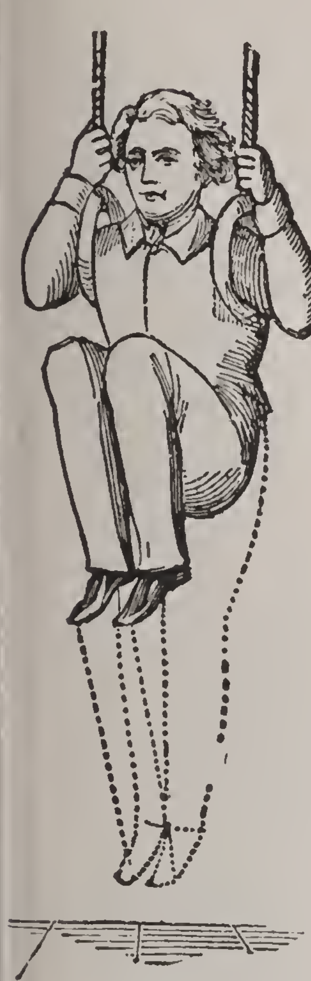


FIGURE 6.

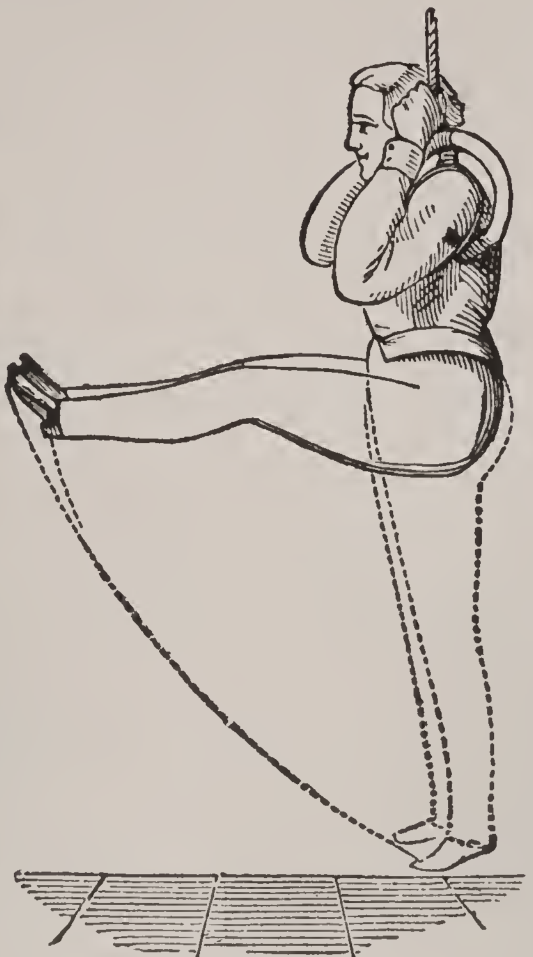


FIGURE 7.

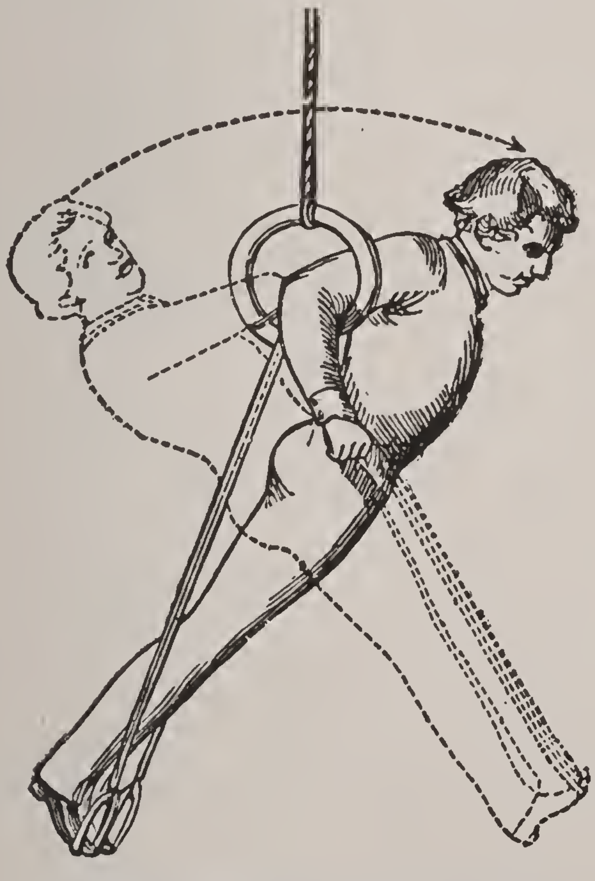


FIGURE 8.

It is our purpose to present the uses of the swing and stirrups, for they certainly possess the advantages of all other gymnastic apparatus. We would not underrate the value of other apparatus and modes of exercise. We offer the swing and stirrups, not as a full response to the public demand, but as the most complete "multum in parvo" in the gymnastic field, and as most admirably adapted to the wants of those who cannot avail themselves of the advantages of a gymnastic institution. To all such it is a God-send.

It is comparatively easy to devise gymnastic exercises which shall interest a social class, enlivened by music. But what shall those do, who, finding it inconvenient or disagreeable to visit the gymnasium, would cultivate muscle and vigor at home? In the absence of social stimulus and music, the exercises themselves must possess peculiar fascination. If, in addition, they bring every part of the body into varied action, giving the left arm, shoulder—the entire left half of the body as much and as varied exercise as the right, we should have the model home gymnastics.

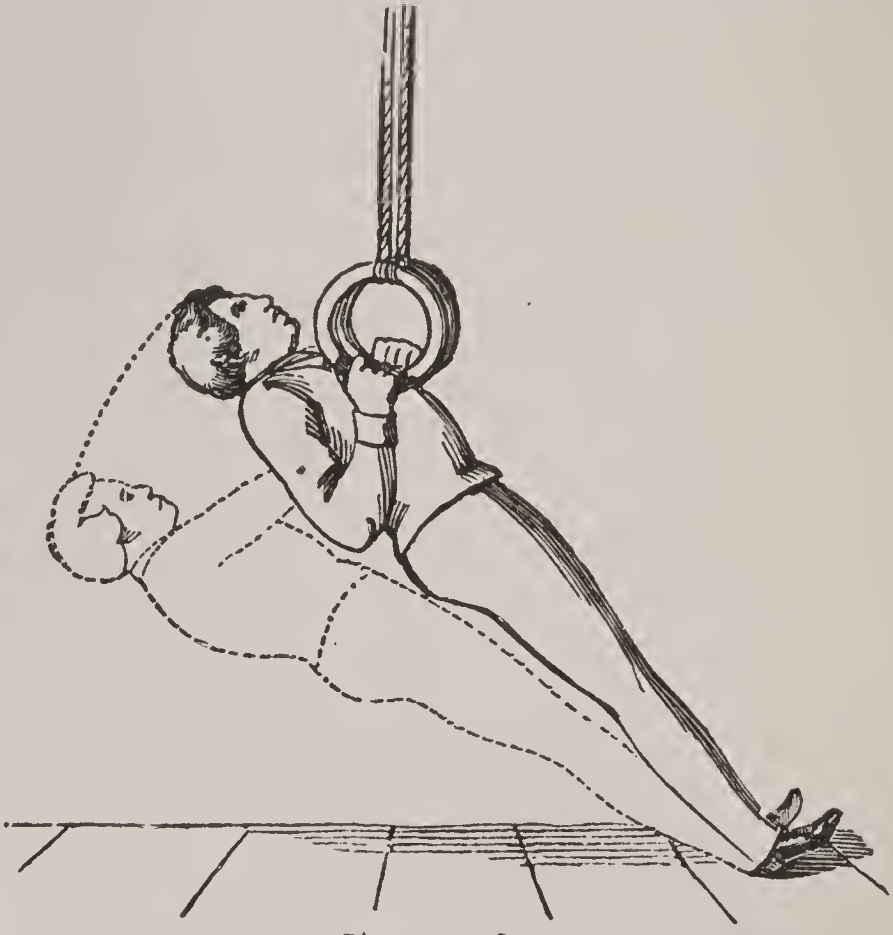


FIGURE 9.

The swing and stirrups meet these demands more successfully than any other apparatus yet devised. While the first exercises of the first series are simple enough for children, the last exercises of the last series are beyond the reach of all except those who have favorable composition and are very much in earnest. For clergymen, ladies and many others, who would carry on the work at home, this invention is the most complete means imaginable.

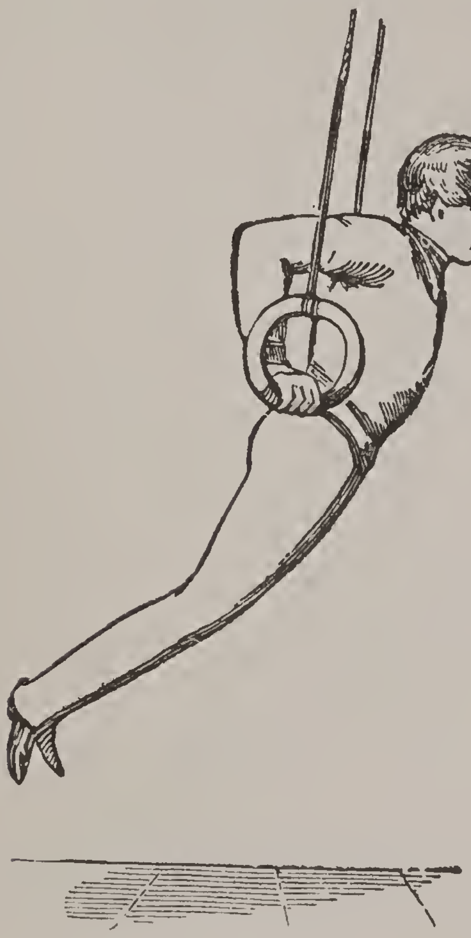


FIGURE 10.

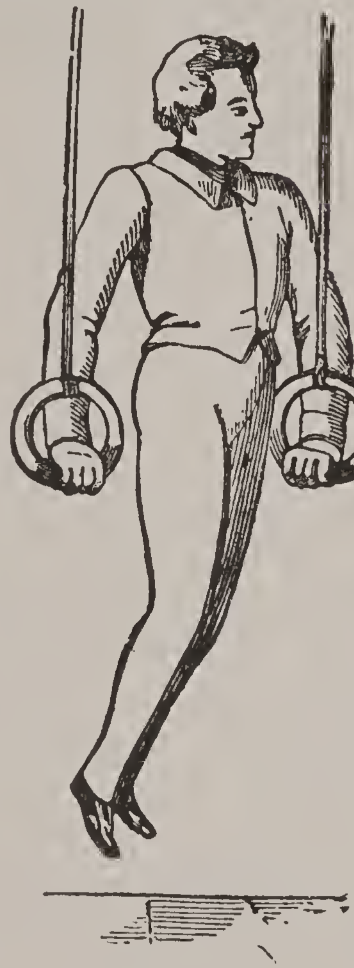


FIGURE 11.

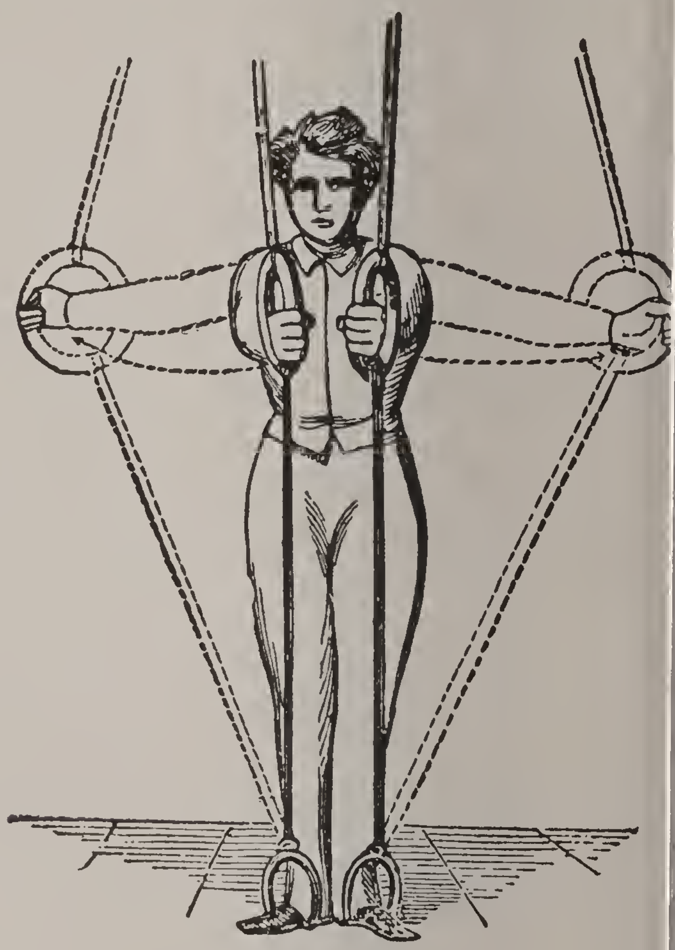


FIGURE 12.

Two large hand rings are suspended from the ceiling by ropes, which, running through padded hooks, are carried to the walls. Two other ropes extend from the walls directly to the hand rings. A strap with a stirrup is placed in either hand ring. By a simple arrangement on the wall the hand rings are drawn as high as the performer can reach, or let down within a foot of the floor; or at any altitude they can be drawn apart to any distance. The distance between the stirrups and rings can be likewise varied.

The usefulness of the swing and stirrups depends upon the facility with which these changes can be made. The rings must b raised, let down, drawn apart, the stirru straps changed, or removed altogether fro the rings, each and all with a single motic of the hand and in a moment; there a various simple mechanical contrivances b which these multifarious changes can b made. An ingenious mechanic can scarcel be at fault. We will suggest that in splicin the ropes into the rings the splice should b long and drawn close; else giving way, a unpleasant surprise may occur; the rop should run through strong, padded hooks the ceiling, which are fastened on the upp side of the timber with thick nuts; the fa tenings on the wall must be made secure.

The ropes with which the rings are sep rated should be armed with wrought ir snap hooks, which can be caught in wrought iron rings that have been firm lashed into the suspension rope at the poi where it connects with the hand ring.

The stirrup straps must be of very stron white leather, with edges so rounded th the pants will not be worn.

THE NEW MINT

AT

PHILADELPHIA.

agnificent Building for the Uses of the Government—All the Appliances Thoroughly Up-to-date—Wonderful Mechanism for Coining Money.

THE new Mint which our Government has built for itself at Sixteenth and Spring Garden Sts., Philadelphia, is the handsomest and most complete institution ever dedicated to e manufacture of legal tender in this any other country.

The building in appearance is an archi-ctural gem, of long dignified lines, and appy proportions, and, fortunately, is tuated on a broad thoroughfare, thereby iving the passer-by the rare opportunity seeing the pile in its entirety from the reet.

Huge foundry that it is, the artistic side as not been forgotten in the designs for e great building and such decorative ork as has been used is placed where its fect on the visitor will be strongest.

Massive Bronze Doors.

Passing up the broad granite steps one confronted by three sets of bronze doors, mple in design, but massive to the ex-nt of impressiveness and swinging on their ponderous hinges they admit to the gorgeous mosaic-roofed foyer, pillared and arched, and containing the rainbow-like allegories typifying the art of coinage in its infancy.

Across the hallway is the grand stairway, with its big graven eagles guarding the way with outstretched wings, serving as a bridge from the atmosphere of art, which permeates the vaulted entranceway, to the plain, practical world beyond.

It is in these spacious, high-ceilinged rooms that the interest in the building lies; it is here that there is installed a mechanical plant that will outrival any money-making plant in the world, and represents the most up-to-date establishment of any sort built and operated by the United States Government

Electricity is the password for every appliance that knocks for entrance here, and nothing that will not lend itself to the energy of the dynamo can find a resting place.

The building is a gigantic bunch of electrical nerves, and the floors of the many rooms are tattooed with little brass plates which mark the spots where these vibrating nerves may be tapped to se-

NEW UNITED STATES MINT AT PHILADELPHIA

cure the power used in driving the machinery.

Independent Motors.

Every machine in the place has its own motor attached, thereby rendering its use independent of any other part of the system, making it possible to operate the smallest device, both night and day, without moving any other part of the system.

The motors range from one-quarter of a horse power to fifty-horse power, and are supplied by four engines, representing eight hundred kilo-watts. The engines, in turn, are operated by steam from eight boilers, connected with the engines by two complete pipe systems, which reduce the chances of a tie-up almost to an impossibility.

These boilers consume their own smoke, too, saving the waste fuel that usually passes off in black clouds from the tall stacks, and utilizes the exhaust steam from the engines for the purpose of heating the building. Here, too, electricity is called on to run the big fan that drives a torrent of cold air over a room full of steam pipes, so intricate and tortuous that they look like a giant's bowl of macaroni.

Electric Fans.

The air heated by contact with the pipes passes into the rooms, after which other electric fans draw it out, keeping the atmosphere of the building always fresh. The most powerful of the motors are to drive the big rolling mills which draw the gold and silver ingots down to the desired thickness for coining. The rolling mills to be used for this purpose are an innovation in the minting of coins, and will not only make the work of reduction more accurate but will turn out the thin metal strips more quickly than the old method, wherein the bars were drawn between two upright studs placed at a distance apart equal to the thickness of the coin to be stamped.

Then, according to the demands of the machine, the motors change in size down to those used on the delicate weighing machines brought over from Europe.

These scales are used to test the weight of the blank metal discs before they are stamped into coins, and not only give their exact weight but separate them into three classes—those under weight, which are melted over, those correct and ready for coining and the heavy ones that are taken to the adjusting room and filed down to proper size.

Quick Work.

Not only does this contrivance give us gold coins of a greater degree of fineness, but does the work very much quicker. The operation consists in placing the gold ingot in a porcelain jar filled with an acid solution parallel to a strip of pure gold, through which a current of electricity is passed. As the acid slowly dissolves the ingot the impurities, usually tin and antimony, fall to the bottom of the jar, while the gold is attracted to the strips of the same metal which is charged with electricity.

This process, known as the "electric," was brought from Germany by Mr. H. J. Slaper, superintendent of the refinery at the Philadelphia Mint, and was used in the old Mint for experimental purposes. It entirely does away with the old process of dissolving and boiling, and will be placed on a practical working basis in the new Mint for the first time in this country.

As simple as it may seem, this method of refining is not without its drawbacks. The jars for holding the acid, which were made in this country, were not equal to the work, and it became necessary to import a lot of twenty from Germany, the cost of which was $1200.

The lighting of the entire plant is by electricity, and so perfect are the arrangements that no provision whatever has been made for the use of gas. Notwithstanding this, a gas plant is being put in, which will furnish 25,000 cubic feet an hour. This will be used solely as fuel in the annealing process, instead of the coal and wood formerly used at the old mint.

Eight Elevators.

Eight elevators are required to handle the work which Superintendent Boyer is expected to do, and each one has its individual motor attached to its drum. One of these lifts is a massive affair with a capacity of eight tons, and is used to carry the heavy machinery to the upper floors.

The machine shop is a big establishment in itself, and will not only make the coining machinery used in the mint, but will be able to produce machinery for the mints of other cities. Here, as in the other departments, the lathes, planes and drills are run by motors attached to the machines.

In the matter of electrical signal systems the one used in the gold vault is unique. The entire compartment is lined with two layers of metal, separated just enough to prevent contact, and each layer connected in such a way that if perforated from the outside with a metal tool it would form a complete circuit and start bells enough to give a good imitation of a fire alarm in a small town.

The entire building is supplied with electric clocks, which are connected w h a master clock in the superintenden's office, this one being connected with t e system operated from Washington.

Although no effort has been spared o make the structure absolutely fire-proof, it was thought wise to be in a position o get immediate help in case of an emrgency, and with that end in view an elborate arrangement of electrical fire sinals were put in, so that a fire in any pa t of the works could be detected instantly

Watchmen's Clocks.

In all the principal rooms there are eletrical watchmen's clocks, which registr in the main office the presence of t e watchman in that part of the building t a certain time, and, in addition to this, t is the duty of the guard to report "al s well" to the central station every hour f the night. Failure to do this within fie minutes after the hour would bring a patrol wagon load of bluecoats to the mi t in a very few minutes.

The new plant has a capacity thre times as great as the old establishmen, and in addition to the efficient methods f the old mint, has all the newest and be that the world has devised for the aid f the coiner.

That nothing might escape him, Supeintendent Boyer sent a representative Europe, where he made a careful inspetion of all the principal mints. His repo was in favor of our coinage plants, bu what we lacked he brought over for th big place at Sixteenth and Spring Garde Streets, Philadelphia.

THE EARTH IS WEARING OUT.

Fertility of the Soil Diminishing—Phosphates of Florida—The World Ransacked for New Fertilizers.

BY this is meant the fertility of the earth, its producing capacity, and that more particularly in the two Americas and in the tropical and semi-tropical zone of the Old World. The Chinese and the Hindoos, though they rank among the weakest peoples of civilization, yet have shown conservatism in dealing with the earth's fertility which should shame some of the nations that have been murdering and looting in China.

Turned Into a Desert.

The ancient empires of Assyria, Persia and Palestine reduced the earth to a desert, for artificial fertilization was then unknown. Egypt escaped utter desolation, for her source of fertility, the Nile, remains unchangeable. Greece, Rome, Italy, and Spain, perpetuated barbarous abuses upon their soil resources, but they are slowly recovering their lost ground and rebuilding the fertility laid waste by their degraded ancestors of the Middle Ages. Italy, for instance, consumed in 1898 a total of 228,690 tons of commercial fertilizers, and in 1899 277,315 tons, showing a rapid increase. France imported in 1898, 187,676,000 kilograms of nitrate of soda; in 1900 she imported 240,787,300 kilograms. Of natural phosphates, in the two years, 133,405,400 and 249,188,000 kilograms respectively.

Commercial Fertilizers.

The earth is ransacked for new supplies. In Australia, previous to 1895, the use of commercial fertilizers was insignificant, being confined to a few gardens, for the bone dust was found heating, and in that arid climate this was injurious. But since that year the cool rock phosphates of Florida have been gaining ground, and in the year 1900 the colony of South Australia alone imported 22,082 tons. A surprising gain in the yield of wheat results; from the application of seventy or eighty pounds per acre the farmer receives an increase of eight to eighteen bushels per acre, sometimes even twenty.

The fact is, the vast majority of mankind, even of the civilized nations, are still in ignorance or only just awakening to the value of artificial fertilizers. The Chinese have always been misers of fertility, and while they have practically no system of sewerage, they save the wastes of their cities by effective though offensive methods. Berlin has her fertilizer farms by which the wastes of that city are rendered a source of municipal profit. But the Anglo-Saxon nations continue their wasteful administration, by which the fertility of the world is poured in mighty streams down the sewers of England and America, as centuries ago it ran down the Cloaca Maxima of Rome.

Value of Fertilizers.

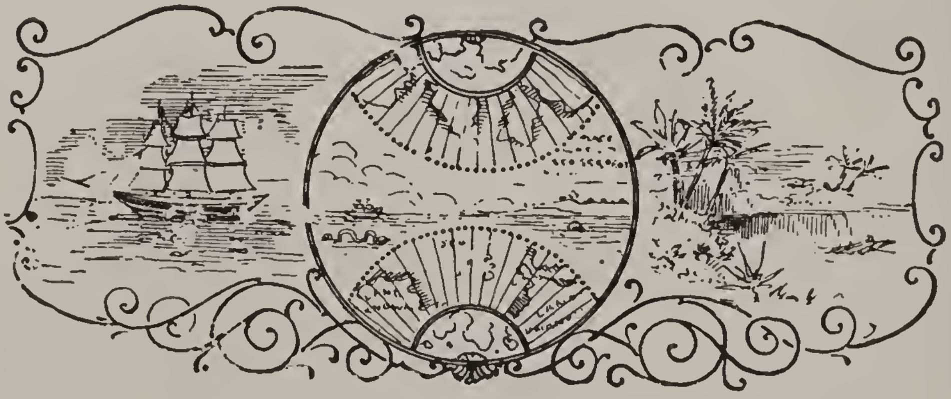
The Anglo-Saxons are the best farmers of all men, but the most destructive of their sources of fertility. We buy with money from the ends of the earth what the despised Chinaman husbands out of his own resources. What will the end be, when we can no longer ransack creation for fertilizers? It is not difficult to foresee

As a natural consequence of this increasing demand for fertilizers all over the world, there has been a sharp advance in prices. In the last two or three years sulphate of ammonia has advanced from $5 to $7 a ton; nitrate of soda, $3 to $5; dried blood, $7 to $11; high-grade blood and bone, $7 to $9; lower grades in proportion; cotton-seed meal, $2 to $3; sulphate of potash, $2. Acid phosphate and dissolved bone have advanced little if any, but the demand for them is firm.

Growing Demand.

We might have mentioned the high price of cotton as another cause for this advance. Georgia alone expects to use fully 85,000 tons of fertilizers more a year than formerly. Other cotton growing States will probably not be behind.

The high ocean freights consequent on war are responsible for the rise in nitrate of soda. If the reported discoveries of immense deposits of this mineral on the Mojave Desert are confirmed, prices may ease off a little. But cattle products, blood and bone, etc., cannot well be lowered in price, for the earth has about reached its limit in pastoral resources.



MASTERPIECES OF ELOQUENCE.

ANCIENT AND MODERN ELOQUENCE.

AT the revival of letters in modern Europe, Eloquence, together with her sister muses, awoke, and shook the poppies from her brow. But their torpors still tingled in her veins. In the interval her voice was gone; her favorite languages were extinct; her organs were no longer attuned to harmony, and her hearers could no longer understand her peech. The discordant jargon of feudal anarchy had anished the musical dialects, in which she had always elighted. The theatres of her former triumph were ither deserted, or they were filled with the dabblers of ophistry and chicane. She shrunk intuitively from the ormer, for the last object she remembered to have seen here was the head of her darling Cicero planted upon the ostrum.

She ascended the tribunals of justice; there she und her child, Persuasion, manacled and pinioned by e letter of the law; there she beheld an image of erself, stammering in barbarous Latin, and staggering der the lumber of a thousand volumes. Her heart inted within her. She lost all confidence in herself. gether with all her irresistible powers, she lost proportionably the consideration of the world, until, stead of comprising the whole system of public ucation, she found herself excluded from the circle science, and declared an outlaw from the realms of rning.

She was not however doomed to eternal silence. ith the progress of freedom and of liberal science, various parts of modern Europe, she obtained access mingle in the deliberations of her parliaments. th labor and difficulty she learned their languages, l lent her aid in giving them form and polish. But has never recovered the graces of her former uty, nor the energies of her ancient vigor.

JOHN QUINCY ADAMS.

WHAT IS A MINORITY?

WHAT is a minority? The chosen heroes of this earth have been in a minority. There is not a social, political, or religious privilege that you enjoy to-day that was not ght for you by the blood and tears and patient ring of the minority. It is the minority that have icated humanity in every struggle. It is a minority that have stood in the van of every moral conflict, and achieved all that is noble in the history of the world. You will find that each generation has been always busy in gathering up the scattered ashes of the martyred heroes of the past, to deposit them in the golden urn of a nation's history. Look at Scotland, where they are erecting monuments—to whom?—to the Covenanters. Ah, *they* were in a minority. Read their history, if you can, without the blood tingling to the tips of your fingers. These were in the minority, that, through blood, and tears, and bootings and scourgings—dying the waters with their blood, and staining the heather with their gore—fought the glorious battle of religious freedom.

Minority! if a man stands up for the right, though the right be on the scaffold, while the wrong sits in the seat of government; if he stands for the right, though he eat, with the right and truth, a wretched crust; if he walk with obloquy and scorn in the by-lanes and streets, while the falsehood and wrong ruffle it in silken attire, let him remember that wherever the right and truth are there are always

"Troops of beautiful, tall angels"

gathered round him, and God Himself stands within the dim future, and keeps watch over his own! If a man stands for the right and the truth, though every man's finger be pointed at him, though every woman's lip be curled at him in scorn, he stands in a majority; for God and good angels are with him, and greater are they that are for him than all they that be against him.

JOHN B. GOUGH.

WASHINGTON'S COUNTRY.

Delivered at the centennial celebration of Washington's inauguration, New York, April 30, 1889.

BLOT out from the page of history the names of all the great actors of his time in the drama of nations, and preserve the name of Washington, and the century would be renowned.

We stand to-day upon the dividing line between the first and second century of constitutional government. There are no clouds overhead and no convulsions under our feet. We reverently return thanks to Almighty God for the past, and with confident and hopeful promise march upon sure ground toward the future. The simple facts of these hundred years paralyze the imagination, and we contemplate the vast accumulations of the century with awe and pride. Our population has grown from four to sixty-five millions. Its centre, moving westward five hundred miles since 1789, is eloquent with the founding of cities and the birth of States. New settlements clearing the forests and subduing the prairies and adding four millions to the few thousands of farms which were the support of Washington's republic, create one of the great granaries of the world and open exhaustless reservoirs of national wealth.

The flower of the youth of the nations of continental Europe are conscripted from productive industries and drilling in camps. Vast armies stand in battle array along the frontiers, and a Kaiser's whim or a minister's mistake may precipitate the most destructive war of modern times. Both monarchial and republican governments are seeking safety in the repression and suppression of opposition and criticism. The volcanic forces of democratic aspiration and socialistic revolt are rapidly increasing and threaten peace and security. We turn from these gathering storms to the British Isles and find their people in the throes of a political crisis involving the form and substance of their government, and their statesmen far from confident that the enfranchised and unprepared masses will wisely use their power.

But for us no army exhausts our resources nor consumes our youth. Our navy must needs increase in order that the protecting flag may follow the expanding commerce, which is to successfully compete in all the markets of the world. The sun of our destiny is still rising, and its rays illuminate vast territories as yet unoccupied and undeveloped, and which are to be the happy homes of millions of people. The questions which affect the powers of government and the expansion or limitation of the authority of the Federal Constitution are so completely settled and so unanimously approved, that our political divisions produce only the healthy antagonism of parties which is necessary for the preservation of liberty.

Our institutions furnish the full equipment of shield and spear for the battles of freedom, and absolute protection against every danger which threatens the welfare of the people will always be found in the intelligence which appreciates their value, and the courage and morality with which their powers are exercised. The spirit of Washington fills the executive office. Presidents may not rise to the full measure of his greatness, but they must not fall below his standard of public duty and obligation. His life and character, conscientiously studied and thoroughly understood by coming generations, will be for them a liberal education for private life and public station, for citizenship and patriotism, for love and devotion to Union and Liberty. With their inspiring past and splendid present the people of these United States, heirs of a hundred years marvelously rich in all which adds to the glory and greatness of a nation, with an abiding trust in the stability and elasticity of their Constitution and an abounding faith in themselves, hail the coming century with hope and joy.

CHAUNCEY M. DEPEW.

THE ULTIMA THULE.

WHEN we engage in that solemn study h
history of our race ; surveying the pro
of man, from his cradle in the eas
these limits of his wanderings ; whe
behold him forever flying westward from civil an re
ligious thraldom, over mountains and seas, seeking
and finding none, but still pursuing the flying bo
promise to the glittering hills which it span
Hesperian climes ; we cannot but exclaim, with Bi
Berkeley, the generous prelate, who bestowed
benefactions, as well as blessings, on our country—

> "Westward the course of empire takes its way
> The first four acts already past,
> A fifth shall close the drama with the day;
> Time's noblest offspring is the last."

This exclamation is but the embodiment of a vi
which the ancients, from the earliest period, cheri
of some favored land beyond the mountains and
seas ; a land of equal laws and happy men.
primitive poets placed it in the Islands of the B
the Doric bards dimly beheld it in the Hyperb
region ; the mystical sage of the Academy found
his lost Atlantis ; and even the stern spirit of Se
dreamed of the restoration of the golden age in
tant worlds, hereafter to be discovered.

Can we look back upon these uninspired predict
and not feel the weight of obligations which
imply? Here must these bright fancies be tu
into truth ; here must these high visions be real
in which the seers and sages of the elder world
refuge from the calamities of the days in which
lived. There are no more continents to be reve
Atlantis hath arisen from the ocean ; the far
thule is reached ; there are no more retreats be
the sea, no more discoveries, no more hopes.

EDWARD EVERE

CALIFORNIA AND PLYMOUTH ROC

LET us vote upon the measures before us, b
ning with the admission of California.
us vote her in. Let us vote, after
months' talk. The people who have
there have done honor to the American name. S
ing from a thousand points, and meeting as stra
far removed from law and government, they have
ducted themselves with the order, decorum and ju
which would have done honor to the oldest establi
and best regulated community. They have carrie
institutions to the furthest verge of the land—t
coast of the Pacific, and lit it up with the ligh
religion, liberty, and science—lights which will
across the broad ocean, and illuminate the dark re
of benighted Asia. They have completed the
of the Pilgrim Fathers.

Would to God that those who landed on the
and on the banks of the James river, more tha

hundred years ago, and who crossed the stormy Atlantic in search of civil and religious liberty, and who did so much for both in their day and generation, could now see what has been done in our day! could ook down from their celestial abodes, and see the spark which they struck from the flint now blazing vith a light which fixes the gaze of the world—see he mustard seed which they planted, now towering to he skies, and spreading its branches from the Atlantic o the Pacific. With what rapture would they welome the Pilgrims of California into the family circle, vhile we, their descendants, sit here in angry debate, epulsing our brethren, calculating the value of the Jnion, and threatening to rend it asunder if California s admitted.

THOMAS H. BENTON.

EULOGIUM ON ANDREW JACKSON.

NO man in private life so possessed the hearts of all around him—no public man of this century ever returned to private life with such an abiding mastery over the affections of the eople. No man with truer instinct received American eas—no man expressed them so completely, or so ldly or so sincerely. He was as sincere a man as er lived. He was wholly, always, and altogether ncere and true. Up to the last, he dared to do anything that it was right to do. He united personal urage and moral courage beyond any man of whom story keeps the record. Before the nation, before e world, before coming ages, he stands forth the presentative, for his generation, of the American nd. And the secret of his greatness is this: by uitive conception, he shared and possessed all the ative ideas of his country and his time. He exssed them with dauntless intrepidity; he enforced em with an immovable will; he executed them with electric power, that attracted and swayed the erican people. The nation, in his time, had not great thought, of which he was not the boldest and arest expositor.

History does not describe the man that equalled him firmness of nerve. Not danger, not an army in tle array, not wounds, not wide-spread clamor, not , not the anguish of disease, could impair, in the t degree, the vigor of his steadfast mind. The oes of antiquity would have contemplated with the unmatched hardihood of his character; and poleon, had he possessed his disinterested will, ld never have been vanquished. Andrew Jackson er was vanquished. He was always fortunate. He quered the wilderness; he conquered the savage; he quered the bravest veterans trained in the battle-s of Europe; he conquered everywhere in statesman-; and, when death came to get the mastery over him, urned that last enemy aside as tranquilly as he had the feeblest of his adversaries, and escaped from h in the triumphant consciousness of immortality. is body has its fit resting-place in the great central valley of the Mississippi; his spirit rests upon our whole territory; it hovers over the vales of Oregon, and guards, in advance, the frontier of Del Norte. The fires of party spirit are quenched at his grave. His faults and frailties have perished. Whatever of good he has done lives, and will live forever.

GEORGE BANCROFT.

INJUSTICE TOWARD KOSSUTH.

THE Emperor of Russia demands of Turkey that the noble Kossuth and his companions shall be given up. This demand is made in derision of the established law of nations. Gentlemen, there is something on earth greater than arbitrary or despotic power. The lightning has its power, and the whirlwind has its power, and the earthquake has its power. But there is something among men more capable of shaking despotic power than lightning, whirlwind, or earthquake—that is, the threatened indignation of the whole civilized world.

Let no one imagine that mere force can subdue the general sentiment of mankind. It is much more likely to extend that sentiment, and to destroy that power which he most desires to establish and secure. The bones of poor John Wickliffe were dug out of his grave seventy years after his death, and burnt, for his heresy, and his ashes were thrown upon a river in Warwickshire. Some prophet of that day said:

"The Avon to the Severn runs,
The Severn to the sea,
And Wickliffe's dust shall spread abroad
Wide as the waters be."

Gentlemen, if the blood of Kossuth is taken by an absolute, unqualified, unjustifiable violation of national law, what will it appease—what will it pacify? It will mingle with the earth—it will mix with the waters of the ocean—the whole civilized world will snuff it in the air, and it will return with awful retribution on the heads of those violators of national law and universal justice. I cannot say when, or in what form; but depend upon it, that if such an act take place, the thrones and principalities and powers must look out for the consequences.

DANIEL WEBSTER.

THE SOURCE OF PARTY WISDOM.

I HAVE seen the sea lashed into fury and tossed into spray, and its grandeur moves the soul of the dullest man; but I remember that it is not the billows, but the calm level of the sea, from which all heights and depths are measured. When the storm has passed and the hour of calm settles on the ocean, when the sunlight bathes its smooth surface, then the astronomer and surveyor take the level from which to measure all terrestrial heights and depths

Gentlemen of the convention, your present temper may not mark the healthful pulse of our people when our enthusiasm has passed. When the emotions of this hour have subsided we shall find that calm level of public opinion below the storm, from which the thoughts of a mighty people are to be measured, and by which their final action will be determined. Not here in this brilliant circle, where fifteen thousand men and women are assembled, is the destiny of the Republican party to be declared. Not here, where I see the faces of seven hundred and fifty-six delegates waiting to cast their votes in the urn and determine the choice of the republic, but by four million Republican firesides, where the thoughtful voters, with wives and children about them, with the calm thoughts inspired by the love of home and country, with the history of the past, the hopes of the future, and a knowledge of the great men who have adorned and blessed our nation in days gone by—there God prepares the verdict that shall determine the wisdom of our work to-night. Not in Chicago, in the heats of June, but in the sober quiet that comes to them between now and November; in the silence of deliberate judgment will the great question be settled.

JAMES A. GARFIELD.

DEATH OF NAPOLEON.

HE was an emperor. But he saw around him a mother, brothers and sisters, not ennobled; whose humble state reminded him and the world that he was born a plebeian; and he had no heir to wait for the imperial crown. He scourged the earth again, and again fortune smiled on him even in his wild extravagance. He bestowed kingdoms and principalities upon his kindred—put away the devoted wife of his youthful days, and another, a daughter of Hapsburgh's imperial house, joyfully accepted his proud alliance. Offspring gladdened his anxious sight; a diadem was placed on its infant brow, and it received the homage of princes, even in its cradle.

Now he was indeed a monarch—a legitimate monarch—a monarch by divine appointment—the first of an endless succession of monarchs. But there were other monarchs who held sway in the earth. He was not content, he would reign with his kindred alone. He gathered new and greater armies, from his own land—from subjugated lands. He called forth the young and brave—one from every household—from the Pyrenees to the Zuyder-Zee—from Jura to the ocean. He marshalled them into long and majestic columns, and went forth to seize that universal dominion, which seemed almost within his grasp. But ambition had tempted fortune too far. The nations of the earth resisted, repelled, pursued, surrounded him. The pageant was ended.

The crown fell from his presumptuous head. The wife who had wedded him in his pride forsook him when the hour of fear came upon him. His child was ravished from his sight. His kinsmen were degraded to their first estate, and he was no longer emperor, nor
consul, nor general, nor even a citizen, but an
and a prisoner, on a lonely island, in the midst of
wild Atlantic. Discontent attended him here.
wayward man fretted out a few long years of his
unbroken manhood, looking off at the earliest d
and in evening's latest twilight, toward that dis
world that had only just eluded his grasp. His h
corroded. Death came, not unlooked for, thoug
came even then unwelcome. He was stretched o
bed within the fort which constituted his prison.
few fast and faithful friends stood around, with
guards who rejoiced that the hour of relief from
and wearisome watching was at hand. As his stre
wasted away, delirium stirred up the brain fron
long and inglorious inactivity.

The pageant of ambition returned. He was a
a lieutenant, a general, a consul, an emperor of Fra
He filled again the throne of Charlemagne.
kindred pressed around him, again invested with
pompous pageantry of royalty. The daughter of
long line of kings again stood proudly by his side,
the sunny face of his child shone out from ben
the diadem that encircled its flowing locks.
marshals of Europe awaited his command.
legions of the old guard were in the field, their sca
faces rejuvenated, and their ranks, thinned in
battles, replenished. Russia, Prussia, Denmark
England gathered their mighty hosts to give
battle. Once more he mounted his impatient cha
and rushed forth to conquest. He waved his s
aloft and cried "TETE D'ARMEE." The feverish v
broke—the mockery was ended. The silver cord
loosened, and the warrior fell back upon his bed a
less corpse. This was the end of earth. The Cor
was now content.

WILLIAM H. SEWA

TRUE GRANDEUR OF NATIONS.

CASTING our eyes over the history of nat
with horror we discern the succession of
derous slaughters, by which their progres
been marked. Even as the hunter trace
wild beast, when pursued to his lair, by the drop
blood on the earth, so we follow man, weary, stagg
with wounds, through the black forest of the
which he has reddened with his gore. O, let it
be in the future ages, as in those which we now
template! Let the grandeur of men be discer
not in bloody victories, or in ravenous conquests,
in the blessings which he has secured; in the goo
has accomplished; in the triumphs of benevolence
justice; in the establishment of perpetual peace.

As the ocean washes every shore, and, with all
bracing arms, clasps every land, while, on its hea
bosom, it bears the products of various climes
peace surrounds, protects, and upholds all
blessings. Without it, commerce is vain, the
of industry is restrained, justice is arrested, happ
is blasted, virtue sickens and dies.

And peace has its own peculiar victories, in comarison with which Marathon and Bannockburn and unker Hill, fields held sacred in the history of uman freedom, shall lose their lustre. Our own ashington rises to a truly heavenly stature—not hen we follow him over the ice of the Delaware to e capture of Trenton—not when we behold him ictorious over Cornwallis at Yorktown—but when we gard him in noble deference to justice, refusing the ingly crown which a faithless soldiery proffered, and, a later day, upholding the peaceful neutrality of e country, while he received unmoved the clamor of e people wickedly crying for war.

CHARLES SUMNER.

VICISSITUDES OF 1849.

THIS fatal year, '49—will it never have done with its desolations? Pestilence has stalked, and still stalks, with desolating tread over the broad earth, defacing its green sod to make om for innumerable graves—graves not alone of e weak and the wretched, but also of the mighty, e glorious, the gentle, the lovely, the widely and eenly deplored. And that darker scourge, despotism, e dominion of brute force and blind selfishness—the rdship of the few for their own luxury and aggranizement over the many whom they scorn, and sweat, d starve—when before has a year been so fruitful as ow, of triumphs to the realm of night? Sicily beayed and ruined—Lombardy's chains riveted—Sarinia crushed—Rome, generous, brave, ill-fated Rome, o!—she lies beneath the feet of her perfidious, perured foes, and in her fall has dragged down the publicans of France, adjudged guilty of the crime of aring to resist the assassination of a sister republic.

But this is not all, nor half. Germany, through her ast extent, has passed over to the camp of absolutism -her people still think, but dare not speak, for the ayonet is at their throats, and democracy is once ore treason, since its regal enemies have recovered om their terror, and found their military tools as rainless and as heartless as ever. At last Hungary ounts the funeral pyre of freedom and the sacrifice is omplete, for Venice must trail her flag directly on e tidings of Gōrgey's victory. She has stood out obly, for a noble, a priceless cause—so has Hungary ruggled nobly and nobly fallen. For the present, all over. save that a few desperate, heroic patriots will et sell their lives in fruitless casual conflicts with the inions of despotism. Nothing now remains but that e wolves should divide and devour their prey.

HORACE GREELEY.

O EXTENSION OF FREEDOM BY FORCE.

SIR, our institutions are telling their own story by the blessings they impart to us, and indoctrinating the people everywhere with the principles of freedom upon which they are unded. Ancient prejudices are yielding to their mighty influence. Heretofore revered, and apparently permanent systems of government, are falling beneath it. Our glorious mother, free as she has ever comparatively been, is getting to be freer. It has blotted out the corruptions of her political franchise. It has broken her religious intolerance. It has greatly elevated the individual character of her subjects. It has immeasurably weakened the power of her nobles, and by weakening in one sense has vastly strengthened the authority of her crown, by forcing it to rest for all its power and glory upon the breasts of its people.

To Ireland too—impulsive Ireland—the land of genius, of eloquence, and of valor, it is rapidly carrying the blessings of a restored freedom and happiness. In France, all of political liberty which belongs to her, is to be traced to it; and even now it is to be seen cheering, animating, and guiding the classic land of Italy, making the very streets of Rome itself to ring with shouts of joy and gratitude for its presence. Sir, such a spirit suffers no inactivity, and needs no incentive. It admits of neither enlargement nor restraint. Upon its own elastic and never-tiring wing, it is now soaring over the civilized world, everywhere leaving its magic and abiding charm. I say, then, try not, seek not to aid it. Bring no physical force to succor it. Such an adjunct would serve only to corrupt and paralyze its efforts. Leave it to itself, and, sooner or later, man will be free.

REVERDY JOHNSON.

IMPROVEMENT OF THE WEST.

ALL that we ask is to be equal with the other States of this Confederacy in freedom, sovereignty, and independence. Grant us only this, and you will see this whole country, like the giant that gathered strength in his wrestle with Hercules, every time he touched the earth, spring up with an elastic bound to new vigor and power, and the proud galaxy that adorns your stars and stripes shine forth with a rich splendor which nothing but regenerated liberty can give. Enable us to make our roads and canals, to carry on our works of internal improvement, to manage our own internal police, as our genius and necessities may require, and you will soon witness the wonderful change which the uncontrolled and plastic power of self-government can alone accomplish; the waste lands speedily sold and settled, the desert made to smile and blossom as a garden, the country improved and cultivated to its utmost limits, industry stimulated, labor rewarded with rich returns, the people prosperous and happy, and the country rich with every blessing.

What a guarantee to the perpetuity and stability of the government, living in the hearts of its own people, and borrowing its own lustre and glory from their proud, prosperous, and independent condition. And, permit me to tell you, that deep and firm as may be the foundations of our country, still deeper will they be made by the policy which is before you. Let me beseech you to cast aside your prejudices, to throw off from your eyes the scales which have so long blinded you, and to come up to this mighty and momentous question with nothing but the holy impulses of patriotism directing your heart; and you will see inscribed upon our banners Truth and Justice, as all for which we would appeal to you, or ask at your hands. Our strength will be yours. The glory that may surround us will radiate its effulgence to every portion of our common country, and the same destiny that awaits us and our children will be indissolubly connected with your own; and should any great event in the changes of life and the vicissitudes of the affairs of nations ever take place, to pull up the deep foundations of our government, and tear down our noble edifice, let me tell you that in the general wreck of the liberties of the country, the last spark will be found flickering on the plains of the West in the domiciles of the humble tillers of the earth.

A. G. HARRISON.

INVIDIOUS DISTINCTIONS.

SIR, as a Southern man, I represent equally rent, capital, and wages, which are confounded in our estates; and I protest against attempts to array, without cause, without a color of pretext or plausibility, the different classes of society against each other, as if, in such a country as this, there could be any natural hostility or any real distinction between them—a country in which all the rich, with hardly an exception, have been poor, and all the poor may one day be rich—a country in which banking institutions have been of immense service, precisely because they have been most needed by a people who had all their fortunes to make by good character and industrious habits.

Look at that remarkable picture—remarkable not as a work of art, but as a monument of history—which you see in passing through the rotunda. Two out of five of that immortal committee were mechanics, and such men! In the name of God, sir, why should any one study to pervert the natural good sense and kindly feelings of this moral and noble people—to infuse into their minds a sullen envy towards one another, instead of that generous emulation which everything in their situation is fitted to inspire—to breathe into them the spirit of Cain, muttering deep curses and meditating desperate revenge against his brother, because the smoke of his sacrifice has ascended to heaven before his own! And do not they who treat our industrious classes as if they were in the same debased and wretched condition as the poor of Europe, insult them by the comparison?

Why, sir, you do not know what poverty is. We have no poor in this country, in the sense in which that word is used abroad. Every laborer, even the most humble, in the United States soon becomes a capitalist, and even, if he choose, a proprietor of land; for the West, with all its boundless fertility, is open to him. How can any one dare to compare the mechan s of this land (whose inferiority, in any substantial p ticular, in intelligence, in virtue, in wealth, to t e other classes of our society, I have yet to learn) with th t race of outcasts, of which so terrific a picture is p sented by recent writers—the poor of Europe? a ra , among no inconsiderable portion of whom famine a d pestilence may be said to dwell continually; many whom are without morals, without education, with t a country, without a God! and may be said to kn w society only by the terrors of its penal code, and to li e in perpetual war with it. Poor bondmen! mock d with the name of liberty, that they may be sometim s tempted to break their chains, in order that, after a few days of starvation in idleness and dissipation, th y may be driven back to their prison house to take the up again, heavier and more galling than befor ; severed, as it has been touchingly expressed, fro nature, from the common air, and the light of the su ; knowing only by hearsay that the fields are green, th t the birds sing, and that there is a perfume in flowe . And is it with a race whom the perverse institutio s of Europe have thus degraded beneath the conditi n of humanity, that the advocates, the patrons, the protectors of our working-men, presume to compare them? Sir, it is to treat them with a scorn at which the spirit should revolt, and does revolt.

HUGH S. LEGARE.

THE "MAYFLOWER."

METHINKS, I see it now, that one solitar adventurous vessel, the "Mayflower" of forlorn hope, freighted with the prospec of a future state, and bound across the u known sea. I behold it pursuing, with a thousan misgivings, the uncertain, the tedious voyage. Su rise and set, and weeks and months pass, and wint surprises them on the deep, but brings them not th sight of the wished-for shore. I see them no scantily supplied with provisions, crowded almost t suffocation in their ill-stored prison, delayed by calm pursuing a circuitous route; and now, driven in fu before the raging tempest, in their scarcely seaworth vessel. The awful voice of the storm howls throug the rigging. The laboring masts seem straining fro their base; the dismal sound of pumps is heard; th ship leaps, as it were, madly from billow to billow; th ocean breaks, and settles with ingulfing floods over th floating deck, and beats with deadening weight again the staggering vessel.

I see them escape from these perils, pursuing thei all but desperate undertaking, and landed at last, afte a five months' passage, on the ice-clad rocks of Plymouth, weak and exhausted from the voyage, poorl armed, scantily provisioned, depending on the charit of their ship-master for a draught of beer on board drinking nothing but water on shore, without shelter without means, surrounded by hostile tribes.

Shut now the volume of history, and tell me, on an rinciple of human probability, what shall be the fate f this handful of adventurers? Tell me, men of ilitary science, in how many months they were all vept off by the thirty savage tribes enumerated ithin the boundaries of New England? Tell me, olitician, how long did this shadow of a colony, on hich your conventions and treaties had not smiled, nguish on the distant coast? Student of history, ompare for me the baffled projects, the deserted ttlements, the abandoned adventures of other times, nd find the parallel of this! Was it the winter storm, eating upon the houseless heads of women and ildren? was it hard labor and spare meals? was it sease? was it the tomahawk? was it the deep alady of a blighted hope, a ruined enterprise, and a oken heart, aching in its last moments at the recollections of the loved and left, beyond the sea? was it me or all of them united that hurried this forsaken mpany to their melancholy fate? And is it possible, that neither of these causes, that all combined, ere able to blast this bud of hope! Is it possible, at from a beginning so feeble, so frail, so worthy, not much of admiration as of pity, there has gone forth progress so steady, a growth so wonderful, a reality important, a promise yet to be fulfilled so glorious!

EDWARD EVERETT.

GENOA IN HER BEAUTY.

LET me bring to your mind Genoa, called the Superb City of Palaces, dear to the memory of American childhood as the birthplace of Christopher Columbus, and one of the spots st enlightened by the morning beams of civilization, hose merchants were princes, and whose rich argosies, those early days, introduced to Europe the choicest oducts of the East, the linen of Egypt, the spices Arabia, and the silks of Samarcand. She still sits queenly pride, as she sat then—her mural crown udded with towers—her churches rich with marble ors and rarest pictures—her palaces of ancient doges d admirals yet spared by the hand of time—her ose streets, thronged by one hundred thousand inabitants—at the foot of the maritime Alps, as they escend to the blue and tideless waters of the editerranean Sea—leaning with her back against eir strong mountain-sides, overshadowed by the liage of the fig-tree and the olive, while the orange d lemon fill with their perfume the air where reigns rpetual spring. Who can contemplate such a city ithout delight?

CHARLES SUMNER.

EFFECT OF STEADINESS OF PURSUIT.

THE most interesting instance of the efficacy of this steadiness of pursuit was given by the city of Athens; the most interesting, because the object was most so. From the earliest mes, Athens aspired to literature and the elegant arts. By a steady pursuit of the policy adopted with a view to this end, the city of Athens became such a monument of the arts, that even her imperfect and dilapidated remains are at this day the wonder of the world. What splendors, then, must she have emitted in the day of her splendor! When, in her freshness, she met the morning sun, and reflected back a rival glory! When she was full of the masterpieces of genius in every art—creations, that were said to have exalted in the human mind the ideas of the divinities themselves! The fervid eloquence of Demosthenes failed, unequal to the task, to do justice to those immortal splendors, when employed, as it occasionally was, for that purpose, in his addresses to the Athenian people. It was by the steady pursuit of the same policy, that their literary works of every kind came to be equally the masterpieces of human genius; and being more diffused, and less impaired by the injuries of time, than the other monuments of the arts, they were, and still are, the wonder of the world, that, after it, the Athenians themselves could never surpass them; whilst others have never been able to equal them.

Now, what has been the effect? Literature and arts have gathered around that city a charm that was, and is, felt by all mankind; which no distance, no time, can dispel. No scholar, of any age or clime, but has made (in fancy, at least) a pilgrimage to its shore; there to call around him the shades of the mighty dead, whose minds still live, and delight and astonish in their immortal works. It is emphatically the city of the heart, where the affections delight to dwell; the green spot of the earth where the fancy loves to linger. How poor is brute force—even the most magnificent, even the Roman—compared to the empire of mind, to which all other minds pay their voluntary homage! Her literature and her arts acquired to Athens this empire, which her remains still preserve, and always will preserve. In contemplating the phenomenon of her literary achievements, a great and profound writer could not forbear saying, "that it seemed a providential event, in honor of human nature, to show to what perfection the species might ascend." Call it providential if you please—as every event is, in some sense, providential—but it was the effect of artificial causes, as much so as the military power of the Romans; it was the effect of a policy, early adopted, and always after steadily pursued.

ASHER ROBBINS.

INDEMNITY TO THE NIAGARA SUFFERERS.

LET me say to the gentleman, that in Buffalo, he might, on one day, have found a family well housed, well clothed, surrounded with every comfort of life, who, from its hospitality in throwing open its doors to the American soldier, was the next day houseless and homeless, destitute of all things; if he had chanced, eight months afterwards, to be wandering on the flats of the Ohio, he might there see a family scarcely covered by a wretched house, in squalid poverty, one day shivering with ague, and the next consumed with raging fever; if his compassion should lead him to enter and inquire into their situation, he would hear them say, our father lived in plenty and comfort, on the Niagara frontier—he saw the American soldiery ready to perish—he opened his door to take them in—and for that we are here, ruined and in wretchedness. Sir, the sufferings of the French, on their retreat from Moscow, present not too strong a picture to convey a just idea of what was endured while the whole country on the Lakes was converted into one wide cantonment. Had the gentleman seen an American regiment on that frontier drawn up on a frosty morning, and supporting arms while their limbs were chilled to the bone, standing, in their cotton dress, in snow two and three feet deep; had he seen these claimants opening their houses to receive men in immediate danger of perishing (many of them did perish), and afterwards turned out of house and home for doing it, he would not, he could not, deny that something ought to be done for their relief.

The gentleman has insinuated, that the inhabitants of the frontier are actuated wholly by a principle of selfishness; that, unless stimulated by a sense of interest, they will do nothing in their own defence, and will surrender up their property an easy prey to the enemy. But, sir, that gentleman surely did not consider the feelings of the American people when he advanced such a sentiment. If nothing had operated on their minds but selfishness, the army of the frontier could not have been kept together a single day. No, sir, not a single day. There were our soldiers, lying naked and perishing on one bank of the Niagara river, while, directly opposite, they could see the British sentry parading backward and forward in a good comfortable watchcoat, and hear him cry out, cheerfully, "all's well." They had only to cross *en masse* to the British side, to exchange a lodging on the ground, in their cotton that admitted the rain, and, when the rain was over, froze upon their bodies, for warm clothing and good quarters. Had selfishness been the ruling principle, where would have been your militia? Where would have been your regulars?—at their own homes, or over the British lines?

JOSEPH VANCE

EULOGIUM ON SOUTH CAROLINA.

The reader will feel a special interest in this and the following selection from the famous debate between Hayne and Webster. Perhaps no such intellectual gladiators ever met before or since on the floor of the United States Senate.

I CALL upon any one who hears me, to bear witness that this controversy is not of my seeking. The Senate will do me the justice to remember, that at the time this unprovoked and uncalled-for attack was made upon the South, not one word had been uttered by me in disparagement of New Englan nor had I made the most distant allusion either to th Senator from Massachusetts, or the State he represent But, sir, that gentleman has thought proper, f reasons best known to himself, to strike the Sout through one, the most unworthy of her servants. H has crossed the border, he has invaded the State o South Carolina, is making war upon her citizens, an endeavoring to overthrow her principles and h institutions. Sir, when the gentleman provokes me t such a conflict, I meet him at the threshold, I wi struggle while I have life, for our altars and our fir sides; and if God give me strength, will drive back th invader discomfited. Nor shall I stop there. If th gentleman provoke war, he shall have war. Sir, will not stop at the border; I will carry the war int the enemies' territory and not consent to lay down m arms, until I shall have obtained "indemnity for th past, and security for the future."

It is with unfeigned reluctance that I enter upon th performance of this part of my duty—I shrink almos instinctively from a course, however necessary, whic may have a tendency to excite sectional feelings an sectional jealousies. But, sir, the task has been force upon me, and I proceed right onward to a performanc of my duty. Be the consequences what they may, th responsibility is with those who have imposed upo me this necessity. The Senator from Massachusett has thought proper to cast the first stone, and if h shall find, according to the homely adage, that "h lives in a glass house"—on his head be the consequences. The gentleman has made a great flouris about his fidelity to Massachusetts. I shall make n professions of zeal, for the interests and honor of South Carolina—of that my constituents shall judge. If there be one State in the Union (and I say it not in any boastful spirit), that may challenge comparison with any other for a uniform, zealous, ardent and uncalculating devotion to the Union, that State is South Carolina. Sir, from the very commencement of the Revolution up to this hour, there is no sacrifice, however great, she has not cheerfully made; no service she has ever hesitated to perform. She has adhered to you in your prosperity, but in your adversity she has clung to you with more than filial affection. No matter what was the condition of her domestic affairs, though deprived of her resources, divided by parties, or surrounded by difficulties, the call of the country has been to her as the voice of God. Domestic discord has ceased at the sound—every man became at once reconciled to his brethren, and the sons of Carolina were all seen crowding together to the temple, bringing their gifts to the altar of their common country.

What, sir, was the conduct of the South during the Revolution? Sir, I honor New England for her conduct in that glorious struggle: but great as is the praise which belongs to her, I think at least equal honor is due to the South. They espoused the cause of their brethren with generous zeal which did not suffer them to stop to calculate their interest in the dispute. Favorites of the mother country, possessed of neither ships nor seamen to create commercial rivalship; they might have found in their situation a guaranty that their trade would be forever fostered and protected by Great Britain. But trampling on all considerations, either of interest or of safety, they rushed into the conflict, and fighting for principle, periled all in the sacred cause of freedom. Never was there exhibited in the history of the world higher examples of noble daring, dreadful suffering, and heroic endurance, than by the Whigs of Carolina during that revolution. The whole State, from the mountain to the sea, was overrun by an overwhelming force of the enemy. The fruits of industry perished on the spot where they were produced, or were consumed by the foe. The "plains of Carolina" drank up the most precious blood of her citizens—black and smoking ruins marked he places which had been the habitations of her hildren! Driven from their homes into the gloomy nd almost impenetrable swamps, even there the spirit f liberty survived, and South Carolina, sustained by ie example of her Sumters and her Marions, proved y her conduct, that though her soil might be over-un, the spirit of her people was invincible.

ROBERT Y. HAYNE.

OUTH CAROLINA AND MASSACHUSETTS.

THE eulogium pronounced on the character of the State of South Carolina by the honorable gentleman, for her revolutionary and other merits, meets my hearty concurrence. I shall ot acknowledge that the honorable member goes be-re me in regard for whatever of distinguished talent, distinguished character, South Carolina has pro-iced. I claim part of the honor; I partake in the ide of her great names. I claim them for country-en, one and all. The Laurenses, Rutledges, the nckneys, the Sumters, the Marions—Americans —whose fame is no more to be hemmed in by state es, than their talents and patriotism were capable being circumscribed within the same narrow limits. In their day and generation, they served and honored e country, and the whole country, and their renown of the treasures of the whole country. Him whose nored name the gentleman bears himself—does he pose me less capable of gratitude for his patriotism, sympathy for his sufferings, than if his eyes had t opened upon the light in Massachusetts instead South Carolina? Sir, does he suppose it in his ver to exhibit a Carolina name so bright as to pro-e envy in my bosom? No, sir—increased gratifica-n and delight, rather. Sir, I thank God, that if I gifted with little of the spirit which is said to be e to raise mortals to the skies, I have yet none, as I st, of that other spirit which would drag angels vn.

When I shall be found, sir, in my place here in the ate, or elsewhere, to sneer at public merit, because it happened to spring up beyond the limits of my own State and neighborhood; when I refuse, for any such cause, or for any cause, the homage due to American talent, to elevated patriotism, to sincere devotion to liberty and the country; or if I see an uncommon endowment of heaven—if I see extraordinary capacity and virtue in any son of the South—and if, moved by local prejudice, or gangrened by State jealousy, I get up here to abate the tithe of a hair from his just character and just fame, may my tongue cleave to the roof of my mouth!

I shall enter on no encomium upon Massachusetts—she needs none. There she is—behold her and judge for yourselves. There is her history—the world knows it by heart. The past, at least, is secure. There is Boston, and Concord, and Lexington, and Bunker's Hill; and there they will remain forever. The bones of her sons, fallen in the great struggle for independence, now lie mingled with the soil of every State, from New England to Georgia; and there they will lie forever.

And, sir, where American liberty raised its first voice, and where its youth was nurtured and sustained, there it still lives, in the strength of its manhood, and full of its original spirit. If discord and disunion shall wound it—if party strife and blind ambition shall hawk at and tear it; if folly and madness, if uneasiness, under salutary and necessary restraint, shall succeed to separate it from that Union, by which alone its existence is made sure, it will stand in the end, by the side of the cradle in which its infancy was rocked; it will stretch forth its arm with whatever of vigor it may still retain, on the friends who gather around it; and it will fall at last, if fall it must, amidst the proudest monuments of its own glory, and on the very spot of its origin.

DANIEL WEBSTER.

REMEMBRANCE OF WRONGS.

WE are above all this. Let the highland clansman, half naked, half civilized, half blinded by the peat smoke of his cavern, have his hereditary enemy and his hereditary enmity, and keep the keen, deep, and poisonous hatred, set on fire of hell, alive if he can; let the North American Indian have his, and hand it down from father to son, by heaven knows what symbols of alligators, and rattlesnakes, and war-clubs smeared with vermilion and entwined with scarlet; let such a country as Poland, cloven to the earth, the armed heel on the radiant forehead, her body dead, her soul incapable to die, let her "remember the wrongs of days long past;" let the lost and wandering tribes of Israel remember theirs—the manliness or sympathy of the world may allow or pardon this to them; but shall America, young, free, prosperous, just setting out on the highway of heaven, "decorating and cheering the elevated sphere she just begins to move in, glittering like the morning star, full of life and joy," shall she be supposed to be polluting and corroding her noble and happy heart, by moping over old stories of stamp act, and tea tax, and the firing of the Leopard upon the Chesapeake in a time of peace? No, sir; no, sir; a thousand times no!

Why, I protest, I thought all that had been settled. I thought two wars had settled it all. What else was so much good blood shed for on so many more than classical fields of revolutionary glory? For what was so much good blood more lately shed at Lundy's Lane, at Fort Erie, before and behind the lines at New Orleans, on the deck of the Constitution, on the deck of the Java, on the lakes, on the sea, but to settle exactly these "wrongs of past days?" And have we come back sulky and sullen from the very field of honor? For my country I deny it. We are born to happier feelings. We look on England as we look on France. We look on them, from our new world, not unrenowned, yet a new world still; and the blood mounts to our cheeks; our eyes swim; our voices are stifled with emulousness of so much glory; their trophies will not let us sleep; but there is no hatred at all; no hatred; all for honor, nothing for hate! We have—we can have—no barbarian memory of wrongs, for which brave men have made the last expiation to the brave.

RUFUS CHOATE.

LAST CHARGE OF NEY.

THE whole continental struggle exhibited no sublimer spectacle than this last effort of Napoleon to save his sinking empire. Europe had been put upon the plains of Waterloo to be battled for. The greatest military energy and skill the world possessed had been tasked to the utmost during the day. Thrones were tottering on the ensanguined field, and the shadows of fugitive kings flitted through the smoke of battle. Bonaparte's star trembled in the zenith—now blazing out in its ancient splendor, now suddenly paling before his anxious eye. At length, when the Prussians appeared on the field, he resolved to stake Europe on one bold throw. He committed himself and France to Ney, and saw his Empire rest on a single chance.

Ney felt the pressure of the immense responsibility on his brave heart, and resolved not to prove unworthy of the great trust committed to his care. Nothing could be more imposing than the movement of that grand column to the assault. That guard had never yet recoiled before a human foe, and the allied forces beheld with awe its firm and terrible advance to the final charge. For a moment the batteries stopped playing, and the firing ceased along the British lines, as without the beating of a drum, or the blast of a bugle, to cheer their steady courage, they moved in dead silence over the plain. The next moment the artillery opened, and the head of that gallant column seemed to sink into the earth. Rank after rank went down, yet they neither stopped nor faltered. Dissolving squadrons, and whole battalions disappearing one after another in the destructive fire, affected n their steady courage. The ranks closed up as befor and each treading over his fallen comrade, presse firmly on. The horse that Ney rode fell under him and he had scarcely mounted another before it als sunk to the earth. Again and again did that un flinching man feel his steed sink down, till five ha been shot under him.

Then, with his uniform riddled with bullets, and hi face singed and blackened with powder, he marche on foot with drawn sabre, at the head of his men. I vain did the artillery hurl its storm of fire and lea into that living mass. Up to the very muzzles the pressed, and driving the artillerymen from their ow pieces, pushed on through the English lines. But a that moment a file of soldiers who had lain flat on th ground, behind a low ridge of earth, suddenly rose an poured a volley in their very faces. Another an another followed till one broad sheet of flame rolle on their bosoms, and in such a fierce and unexpecte flow, that human courage could not withstand i They reeled, shook, staggered back, then turned an fled. Ney was borne back in the refluent tide, an hurried over the field. But for the crowd of fugitive that forced him on, he would have stood alone, an fallen in his footsteps. As it was, disdaining to fl though the whole army was flying, he formed his me into two immense squares, and endeavored to stem th terrific current, and would have done so, had it n been for the thirty thousand fresh Prussians tha pressed on his exhausted ranks. For a long tim these squares stood and let the artillery plough throug them.

But the fate of Napoleon was writ, and though Ne doubtless did what no other man in the army coul have done, the decree could not be reversed. The sta that had blazed so brightly over the world went dow in blood, and the "bravest of the brave" had foug his last battle. It was worthy of his great name, an the charge of the Old Guard at Waterloo, with hi at their head, will be pointed to by remotest genera tions with a shudder.

J. T. HEADLEY.

INVECTIVE OF HUNGARY.

THE spirit of popular freedom in Europe during the late struggle of Hungary, aske us a solemn question. The Executive wa called upon to say yea or nay. Hungar listened with anxious hopes. She was impatient fo the response, and the eloquence of truth, of a righteou cause, burst forth in every word she uttered. But i has been all in vain, and now, in tones of eloquent an burning reproof, she thus turns to her Russian invade

You seek to encompass the earth with your ambitio The world exclaims against you, and reproachfull calls you sovereign of a barbarian horde. Asia speak out: Your neighborhood has only served to brin upon my borders bloody and protracted wars. Say ersia : For a century you have desolated my remote rontiers and provinces, with the horrors of a cruel varfare. Circassia asks : When will you cease to nassacre my people, and grant me that liberty and ndependence which my victorious arms deserve? ngland reproves : I see you in the swift-coming uture advancing to the banks of the Indus, and bout to bring war upon my dominions in the East. urkey adds : You have converted my cities into forts, nd for centuries obliged me to watch your threatened escent upon my fair capital. France sends her gions to Italy, as she sees her influence about to be elt upon the banks of the Tiber. Poland yet cries eneath her fetters : When will you unbar the prison- oor? Europe chides : Upon the partition of Poland ou claimed the lion's share, and claimed it too at the eace of Vienna.

And now, you offer Siberia in exchange for fair ungary. Yet, I was at peace with you. I sought eedom from Austrian tyranny, and you interfered to rown my misfortunes with your cruelties. You arred against my national existence. You drove my nce happy people to flee for refuge to the mountains ; abandon their hearths ; to forsake their altars ; to oison their waters, lest they might quench your hirst ; to destroy their bread, lest they might feed ou ; to fire their own dwellings, lest they might helter you. The work of destruction, which they ad not time to complete, you finished. You wan- nly desolated their wheat-fields ; you tortured their atriot clergy, and inflicted even upon female patriot- n your proverbial cruelties. And now, from the nchanging snows of Siberia, may be heard the wails unseen Poland, as she rises from her cenotaph, aculates the woes and sufferings you have in store r my children, and with a warning voice whispers, fight on !—fight on ! "

Such is the first invective of Hungary against her ediating oppressor. From this she now turns and peals to the world. To us especially does she thus peal for sympathy. "You were oppressed ; so were . You declared and fought for independence, d triumphed upon the field of battle ; so did we. ou have had the experience of nearly three gener- ions, and will you now by silence and inactivity, anifest before the world a trembling distrust in the stice and wisdom of your principles? In the days your weakness the world sent you a Montgomery, a osciusko, and a La Fayette ; and now, in the days your pride and strength, fear not to make some st return."

A. W. BUEL.

MEANS OF HEALTH.

SEE how the means of sustenance and comfort are distributed and diversified throughout the earth. There is not a mood of body, from the wantonness of health to the languor of death-bed, for which the wonderful alchemy of nature does not proffer some luxury to stimulate our pleasures ; or her pharmacy some catholicon to assuage our pains. What textures for clothing—from the gossamer thread which the silk-worm weaves, to silk-like furs which the winds of Zembla cannot penetrate ! As the materials from which to construct our dwellings, what Quincys and New Hampshires of granite, what Alleghanies of oak, and what forests of pine, belting the continent ! What coal-fields to supply the lost warmth of the receding sun ! Nakedness, and famine, and pestilence are not inexorable ordinances of nature. Nudity and rags are only human idleness or ignorance out on exhibition. The cholera is but the wrath of God against uncleanliness and intemperance. Famine is only a proof of individual misconduct, or of national misgovernment. In the woes of Ireland, God is proclaiming the wickedness of England, in tones as clear and articulate as those in which He spoke from Sinai ; and it needs no Hebraist to translate the thunder.

And if famine needs not to be, then other forms of destitution and misery need not to be. But amid the exuberance of this country, our dangers spring from abundance rather than from scarcity. Young men, especially young men in our cities, walk in the midst of allurements for the appetite. Hence, health is imperiled ; and so indispensable an element is health in all forms of human welfare, that whoever invigorates his health has already obtained one of the greatest guarantees of mental superiority, of usefulness, and of virtue. Health, strength, longevity, depend upon immutable laws. There is no chance about them. There is no arbitrary interference of higher powers with them. Primarily, our parents, and secondarily, ourselves, are responsible for them. The providence of God is no more responsible, because the virulence of disease rises above the power of all therapeutics, or because one quarter part of the race die before completing the age of one year—die before completing one seventieth part of the term of existence allotted to them by the Psalmist ;—I say the providence of God is no more responsible for these things, than it is for picking pockets or stealing horses.

HORACE MANN.

SORROW FOR THE DEAD.

SORROW for the dead is the only sorrow from which we refuse to be divorced. Every other wound we seek to heal : every other affliction to forget ; but this wound we consider our duty to keep open ; this affliction we cherish and brood over in solitude. Where is the mother that would willingly forget the infant that perished like a blossom from her arms, though every recollection is a pang? Where is the child that would willingly forget the most tender of parents, though to remember be but to lament? who, even in the hour of agony, would forget the friend over whom he mourns? who, even when the tomb is closing upon the remains of her he most loved, and he feels his heart, as it were, crushed in the closing of its portal, would accept consolation that was to be bought by forgetfulness? No, the love which survives the tomb is one of the noblest attributes of the soul. If it has its woes, it has likewise its delights; and when the overwhelming burst of grief is calmed into the gentle tear of recollection, when the sudden anguish and the convulsive agony over the present ruins of all that we most loved, is softened away into pensive meditation on all that it was in the days of its loveliness, who would root out such a sorrow from the heart? Though it may sometimes throw a passing cloud even over the bright hour of gaiety, or spread a deeper sadness over the hour of gloom, yet who would exchange it even for the song of pleasure, or the burst of revelry? No; there is a voice from the tomb sweeter than song; there is a recollection of the dead to which we turn even from the charms of the living. Oh, the grave!—the grave! It buries every error; covers every defect; extinguishes every resentment. From its peaceful bosom spring none but fond regrets and tender recollections. Who can look down upon the grave even of an enemy, and not feel a compunctious throb, that ever he should have warred with the poor handful of earth that lies mouldering before him!

The grave of those we loved—what a place for meditation! There it is that we call up in long review the whole history of virtue and gentleness, and the thousand endearments lavished upon us almost unheeded in the daily intercourse of intimacy; there it is that we dwell upon the tenderness, the solemn, awful tenderness of the parting scene; the bed of death with all its stifled griefs; its noiseless attendants; its mute, watchful assiduities; the last testimonies of expiring love; the feeble, faltering, thrilling (oh! how thrilling!) pressure of the hand; the last fond look of the glazing eye, turning upon us even from the threshold of existence; the faint, faltering accents struggling in death to give one more assurance of affection! Aye, go to the grave of buried love, and meditate! There settle the account with thy conscience for every past benefit unrequited, every past endearment unregarded, of that being who can never, never, never return to be soothed by thy contrition!

If thou art a child, and hast ever added a sorrow to the soul, or a furrow to the silvered brow of an affectionate parent; if thou art a husband, and hast ever caused the fond bosom that ventured its whole happiness in thy arms to doubt one moment of thy kindness or thy truth; if thou art a friend, and hast ever wronged in thought, word or deed, the spirit that generously confided in thee; if thou art a lover, and hast ever given one unmerited pang to that true heart that now lies cold and still beneath thy feet; then be sure that every unkind look, every ungracious word, every ungentle action, will come thronging back upon thy memory, and knocking dolefully at thy soul; then be sure that thou wilt lie down sorrowing and repentant on the grave, and utter the unheard groan, and pour the unavailing tear; more deep, more bitter, becau unheard and unavailing.

Then weave the chaplet of flowers, and strew t beauties of nature about the grave; console t broken spirit, if thou canst, with these tender, y futile tributes of regret; but take warning by t bitterness of this thy contrite affliction over the dea and be more faithful and affectionate in thy dischar of thy duties to the living.

WASHINGTON IRVING.

DRESS REFORM.

A CONVENTION has recently been held Vineland, attended by the women who are o posed to extravagance in dress. They pr pose, not only by formal reselution, but b personal example, to teach the world lessons o economy by wearing less adornment and draggin fewer yards of silk. We wish them all succes although we would have more confidence in the mov ment if so many of the delegates had not wor bloomer dresses. Moses makes war upon that sty of apparel in Deuteronomy xxii. 5: "The woma shall not wear that which pertaineth unto man. Nevertheless we favor every effort to stop the ex travagant use of dry goods and millinery.

We have, however, no sympathy with the implica tion that women are worse than men in this respec Men wear all they can without interfering with thei locomotion, but man is such an awkward creature h cannot find any place on his body to hang a grea many fineries. He could not get round in Wall Stre with eight or ten flounces and a big handled paraso and a mountain of back hair. Men wear less tha women, not because they are more moral, but becaus they cannot stand it. As it is, many of our youn men are padded to a superlative degree, and hav corns and bunions on every separate toe from wearin tight shoes.

Neither have we any sympathy with the implicatio that the present is worse than the past in matters o dress. Compare the fashion-plates of the seventeent century with the fashion-plates of the nineteenth, an you decide in favor of our day. The women o Isaiah's time beat anything now. Do we have th kangaroo fashion Isaiah speaks of—the daughters wh walked forth with "stretched forth necks?" Talk o hoops! Isaiah speaks of women with "round tire like the moon." Do we have hot irons for curling ou hair? Isaiah speaks of "wimples and crisping pins." Do we sometimes wear glasses astride our nose, no because we are near-sighted, but for beautification Isaiah speaks of the "glasses, and the earrings, an the nose jewels." The dress of to-day is far mor sensible than that of a hundred or a thousand yea ago.

But the largest room in the world is room for im provement, and we would cheer on those who woul attempt reformation either in male or female attire.

Meanwhile, we rejoice that so many of the pearls, and emeralds, and amethysts, and diamonds of the world are coming into the possession of Christian women. Who knows but the spirit of consecration may some day come upon them, and it shall be again as it was in the time of Moses, that for the prosperity of the house of the Lord the women may bring their bracelets, and earrings, and tablets, and jewels? The precious stones of earth will never have their proper place till they are set around the Pearl of Great Price.

T. DE WITT TALMAGE.

WHEN WAR SHALL BE NO MORE.

DEATH shall hereafter work alone and single-handed, unaided by his most terrible auxiliary. The world shall repose in quiet. Far down the vista of futurity the tribes of human kind are seen mingling in fraternal harmony, wondering and shuddering as they read of former brutality, and exulting at their own more fortunate lot. They turn their grateful eyes upon us. Their countenances are not suffused with tears, nor streaked with kindred blood. We hear their voices; they are not swelling with tones of general wailing and despair. We look at their smiling fields, undevastated by the hand of rapine; they are waving with yellow harvests, or loaded with golden fruits; and their sunny pastures are filled with quiet herds, which have never known the wanton ravage of war. We turn to the peaceful homes where our infancy has been cradled; they stand undespoiled by the hand of the destroyer. The scenes where we indulged our childish sports have never been profaned by hostile feet; and the tall groves, where we performed our feats of school-boy dexterity, have never been desecrated to obtain the implements of human destruction.

Then our thoughts extend and embrace the land of our birth, the institutions and laws we so much venerate, and something whispers us they shall endure forever; that all time shall witness their increasing perfection; that all nations shall copy from its example, and derive interminable benefits from its influence; for war, the destroyer of every valuable institution, the great and sole cause of all national ruin, is soon to be seen no more forever.

TREVELYAN FABER.

TRUE PATRIOTISM.

WITH malice toward none; with charity for all; with firmness in the right, as God gives us to see the right, let us strive on to finish the work we are in; to bind up the nation's wounds; to care for him who shall have borne the battle, and for his widow, and his orphan—to do all which may achieve and cherish a just and lasting peace among ourselves, and with all nations.

ABRAHAM LINCOLN.

A MARVELLOUS CLOCK.

OUR brains are seventy-year clocks. The angel of life winds them up at once for all, then closes the cases, and gives the key into the hand of the angel of resurrection. "Tic-tac, tic-tac!" go the wheels of thought; our will cannot stop them; madness only makes them go faster. Death alone can break into the case, and, seizing the ever-swinging pendulum which we call the heart, silence at last the clicking of the terrible escapement we have carried so long beneath our aching foreheads.

OLIVER WENDELL HOLMES.

MEN WHO NEVER DIE.

WE dismiss them not to the chambers of forgetfulness and death. What we admired, and prized, and venerated in them, can never be forgotten. I had almost said that they are now beginning to live; to live that life of unimpaired influence, of unclouded fame, of unmingled happiness, for which their talents and services were destined. Such men do not, cannot die. To be cold and breathless; to feel not and speak not; this is not the end of existence to the men who have breathed their spirits into the institutions of their country, who have stamped their characters on the pillars of the age, who have poured their hearts' blood into the channels of the public prosperity. Tell me, ye who tread the sods of yon sacred height, is Warren dead? Can you not still see him, not pale and prostrate, the blood of his gallant heart pouring out of his ghastly wound, but moving resplendent over the field of honor, with the rose of heaven upon his cheek, and the fire of liberty in his eye? Tell me, ye who make your pious pilgrimage to the shades of Vernon, is Washington indeed shut up in that cold and narrow house? That which made these men, and men like these, cannot die. The hand that traced the charter of independence is, indeed, motionless; the eloquent lips that sustained it are hushed; but the lofty spirits that conceived, resolved, and maintained it, and which alone, to such men, "make it life to live," these cannot expire:

"These shall resist the empire of decay,
When time is o'er and worlds have passed away;
Cold in the dust the perished heart may lie,
But that which warmed it once can never die."

EDWARD EVERETT.

STOPPING THE MARCH OF FREEDOM.

IT is not for men long to hinder the march of human freedom. I have no fear for that ultimately; none at all—simply for this reason: that I believe in the infinite God. You may make your statutes; an appeal always lies to the higher law, and decisions adverse to that get set aside in the ages. Your statutes cannot hold Him. You may gather all the dried grass and all the straw in both continents; you may braid it into ropes to bind down the sea; while it is calm, you may laugh, and say, "Lo, I have chained the ocean!" and howl down the law of Him who holds the universe as a rose-bud in his hand—its every ocean but a drop of dew. "How the waters suppress their agitation," you may say. But when the winds blow their trumpets, the sea rises in his strength, snaps asunder the bonds that had confined his mighty limbs, and the world is littered with the idle hay! Stop the human race in its development and march to freedom! As well might the boys of Boston, some lustrous night, mounting the steeples of the town, call on the stars to stop their course! Gently, but irresistibly, the Greater and the Lesser Bear move round the pole; Orion, in his mighty mail, comes up the sky; the Bull, the Heavenly Twins, the Crab, the Lion, the Maid, the Scales, and all that shining company, pursue their march all night, and the new day discovers the idle urchins in their lofty places all tired, and sleepy, and ashamed.

THEODORE PARKER.

INVECTIVE IN THE "WILKINSON TRIAL."

GENTLEMEN, although my clients are free from the charge of shedding blood, there is a murderer, and, strange to say, his name appears upon the indictment, not as a criminal, but a prosecutor. His garments are wet with the blood of those upon whose deaths you hold this solemn inquest. Yonder he sits, allaying for a moment the hunger of that fierce vulture, conscience, by casting before it the food of pretended regret, and false but apparent eagerness for justice. He hopes to appease the manes of his slaughtered victims—victims to his falsehood and treachery—by sacrificing upon their graves a hecatomb of innocent men. By base misrepresentations of the conduct of the defendants, he induced his imprudent friends to attempt a vindication of his pretended wrongs, by violence and bloodshed. His clansmen gathered at his call, and followed him for vengeance; but when the fight began, and the keen weapons clashed in the sharp conflict—where was the wordy warrior? Aye, "where was Roderick then?" No "blast upon his bugle horn" encouraged his companions as they were laying down their lives in his quarrel; no gleam of his dagger indicated a desire to avenge his fall; with treacherous cowardice he left them to their fate, and all his vaunted courage ended in ignominious flight.

Sad and gloomy is the path that lies before him. You will in a few moments dash, untasted, from his lips, the sweet cup of revenge; to quaff whose intoxicating contents he has paid a price that would have purchased the goblet of the Egyptian queen. I behold gathering around him, thick and fast, dark and corroding cares. That face, which looks so ruddy, and even now is flushed with shame and conscious guilt, will from this day grow pale, until the craven blood shall refuse to visit the haggard cheek. In his broke and distorted sleep his dreams will be more fearfu than those of the "false, perjured Clarence;" an around his waking pillow, in the deep hour of nigh will flit the ghosts of Meeks and Rothwell, shriekin their curses in his shrinking ear.

Upon his head rests not only the blood shed in thi unfortunate strife, but also the soul-killing crime o perjury; for, surely as he lives, did the words of cra and falsehood fall from his lips, ere they were hardl loosened from the holy volume. But I dismiss him and do consign him to the furies, trusting, in a charity, that the terrible punishment he must suffe from the scorpion-lash of guilty conscience will b considered in his last account.

SARGENT S. PRENTISS.

THE BALLOT-BOX.

I AM aware that the ballot-box is not everywher a consistent symbol; but to a large degree it is so I know what miserable associations cluster aroun this instrument of popular power. I know tha the arena in which it stands is trodden into mire b the feet of reckless ambition and selfish greed. Th wire-pulling and the bribing, the pitiful truckling an the grotesque compromises, the exaggeration and th detraction, the melo-dramatic issues and the sham patriotism, the party watchwords and the party nicknames, the schemes of the few paraded as the will of the many, the elevation of men whose only worth is in the votes they command—vile men, whose hands you would not grasp in friendship, whose presence you would not tolerate by your fireside—incompetent men, whose fitness is not in their capacity as functionaries, or legislators, but as organ pipes;—the snatching at the slices and offal of office, the intemperance and the violence, the finesse and the falsehood, the gin and the glory; these are indeed but too closely identified with that political agitation which circles around the ballot-box.

But, after all, they are not essential to it. They are only the masks of a genuine grandeur and importance. For it is a grand thing—something which involves profound doctrines of right—something which has cost ages of effort and sacrifice—it is a grand thing that here, at last, each voter has just the weight of one man; no more, no less; and the weakest, by virtue of his recognized manhood, is as strong as the mightiest. And consider, for a moment, what it is to cast a vote. It is the token of inestimable privileges, and involves the responsibilities of an hereditary trust. It has passed into your hands as a right, reaped from fields of suffering and blood. The grandeur of history is represented in your act. Men have wrought with pen and tongue, and pined in dungeons, and died on scaffolds, that you might obtain this symbol of freedom, and enjoy this consciousness of a sacred individuality. To the ballot have been transmitted, as a were the dignity of the sceptre and the potency of the sword.

And that which is so potent as a right is also pregnant as a duty; a duty for the present and for the future. If you will, that folded leaf becomes a tongue of justice, a voice of order, a force of imperial law; securing rights, abolishing abuses, erecting new institutions of truth and love. And, however you will, it is the expression of a solemn responsibility, the exercise of an immeasurable power for good or for evil, now and hereafter. It is the medium through which you act upon your country—the organic nerve which incorporates you with its life and welfare. There is no agent with which the possibilities of the republic are more intimately involved, none upon which we can fall back with more confidence than the ballot-box.

EDWIN H. CHAPIN.

DANGER OF VAST FORTUNES.

VAST fortunes are a misfortune to the State. They confer irresponsible power; and human nature, except in the rarest instances, has proved incapable of wielding irresponsible power, without abuse. The feudalism of Capital is not a whit less formidable than the feudalism of Force. The millionaire is as dangerous to the welfare of the community, in our day, as was the baronial lord of the middle ages. Both supply the means of shelter and of raiment on the same conditions; both hold their retainers in service by the same tenure—their necessity for bread; both use their superiority to keep themselves superior. The power of money is as imperial as the power of the sword; I may as well depend upon another for my head as for my bread. The day is sure to come, when men will look back upon the prerogatives of Capital, at the present time, with as severe and as just a condemnation as we now look back upon the predatory chieftains of the Dark Ages.

Weighed in the balances of the sanctuary, or even in the clumsy scales of human justice, there is no equity in the allotments, which assign to one man but a dollar a day, with working, while another has an income of a dollar a minute, without working. Under the reign of Force, or under the reign of Money, there may be here and there a good man who uses his power for blessing and not for oppressing his race; but all their natural tendencies are exclusively bad. In England, we see the feudalism of Capital approaching its catastrophe. In Ireland, we see the catastrophe consummated. Unhappy Ireland! where the objects of human existence and the purposes of human government have all been reversed; where rulers, for centuries, have ruled for the aggrandizement of themselves, and not for the happiness of their subjects; where misgovernment has reigned so long, so supremely, and so atrociously, that, at the present time, the "Three Estates" of the realm are Crime, Famine, and Death.

HORACE MANN.

THE WORLD OF BEAUTY AROUND US.

BUT a higher and holier world than the world of Ideas, or the world of Beauty, lies around us; and we find ourselves endued with susceptibilities which affiliate us to all its purity and its perfectness. The laws of nature are sublime, but there is a moral sublimity before which the highest intelligences must kneel and adore. The laws by which the winds blow, and the tides of the ocean, like a vast clepsydra, measure, with inimitable exactness, the hours of ever-flowing time; the laws by which the planets roll, and the sun vivifies and paints; the laws which preside over the subtle combinations of chemistry, and the amazing velocities of electricity; the laws of germination and production in the vegetable and animal worlds;—all these, radiant with eternal beauty as they are, and exalted above all the objects of sense, still wane and pale before the Moral Glories that apparel the universe in their celestial light.

The heart can put on charms which no beauty of known things, nor imagination of the unknown, can aspire to emulate. Virtue shines in native colors, purer and brighter than pearl, or diamond, or prism, can reflect. Arabian gardens in their bloom can exhale no such sweetness as charity diffuses. Beneficence is godlike, and he who does most good to his fellow-man is the Master of Masters, and has learned the Art of Arts. Enrich and embellish the universe as you will, it is only a fit temple for the heart that loves truth with a supreme love. Inanimate vastness excites wonder; knowledge kindles admiration, but love enraptures the soul. Scientific truth is marvellous, but moral truth is divine; and whoever breathes its air and walks by its light has found the lost paradise. For him a new heaven and a new earth have already been created. His home is the sanctuary of God, the Holy of Holies.

HORACE MANN.

SOCIETY WITHOUT MORALITY.

THE mass is changing. We are becoming another people. Our habits have held us, long after those moral causes which formed them have in a great degree ceased to operate. These habits, at length, are giving way. So many hands have so long been employed to pull away foundations, and so few to repair the breaches, that the building totters. So much enterprise has been displayed in removing obstructions from the current of human depravity, and so little to restore them, that the stream at length is beginning to run. It may be stopped now, but it will soon become deep, and broad, and rapid, and irresistible.

The crisis then has come. By the people of this generation, by ourselves probably, the amazing question is to be decided, whether the inheritance of our fathers shall be preserved, or thrown away—whether our Sabbaths shall be a delight, or a loathing—whether the taverns on that holy day shall be crowded with drunkards, or the sanctuary of God with humble worshippers—whether riot and profanity shall fill our streets, and poverty our dwellings, and convicts our jails, and violence our land; or whether industry, and temperance, and righteousness, shall be the stability of our times—whether mild laws shall receive the cheerful submission of freemen, or the iron rod of a tyrant compel the trembling homage of slaves. Be not deceived. Human nature in this nation is like human nature everywhere. All actual difference in our favor is adventitious, and the result of our laws, institutions and habits. It is a moral influence which, with the blessing of God, has formed a state of society so eminently desirable. The same influence which has formed it, is indispensable to its preservation. The rocks and hills of New England will remain till the last conflagration; but, let the Sabbath be profaned with impunity, the worship of God be abandoned, the government and religious instruction of children be neglected the streams of intemperance be permitted to flow, and her glory will depart. The wall of fire will no more surround her, and the munition of rocks will no longer be her defence.

LYMAN BEECHER.

GETTING THE RIGHT START.

THERE is no surer sign of an unmanly and cowardly spirit than a vague desire for help, a wish to depend, to lean upon somebody and enjoy the fruits of the industry of others. There are multitudes of young men who indulge in dreams of help from some quarter coming in at a convenient moment to enable them to secure the success in life which they covet. The vision haunts them of some benevolent old gentleman with a pocket full of money, a trunk full of mortgages and stocks, and a mind remarkably appreciative of merit and genius, who will, perhaps, give or lend them from ten to twenty thousand dollars, with which they will commence and go on swimmingly.

To me one of the most disgusting sights in the world is that of a young man with healthy blood, broad shoulders and a hundred and fifty pounds more or less, of good bone and muscle, standing with his hands in his pockets, longing for help. I admit that there are positions in which the most independent spirit may accept of assistance—may, in fact, as a choice of evils, desire it; but for a man who is able to help himself, to desire the help of others in the accomplishment of his plans of life, is positive proof that he has received a most unfortunate training or that there is a leaven of meanness in his composition.

When, therefore, a young man has ascertained and fully received the fact that he does not know anything, that the world does not care anything about him, that what he wins must be won by his own brain and brawn, and that while he holds in his own hands t means of gaining his own livelihood and the objects his life, he cannot receive assistance without compr mising his self-respect and selling his freedom, he is a fair position for beginning life. When a young ma becomes aware that only by his own efforts can he ri into companionship and competition with the shar strong, and well-drilled minds around him, he is rea for work, and not before.

The next lesson is that of patience, thoroughne of preparation, and contentment with the regul channels of business effort and enterprise. This i perhaps, one of the most difficult to learn of all th lessons of life. It is natural for the mind to reach o eagerly for immediate results.

As manhood dawns, and the young man catches i its first light the pinnacles of realized dreams, th golden domes of high possibilities, and the purplin hills of great delights, and then looks down upon th narrow, sinuous, long, and dusty path by which othe have reached them, he is apt to be disgusted with th passage and to seek for success through broader chan nels, by quicker means. Beginning at the very foot the hill and working slowly to the top seems a ver discouraging process; and precisely at this point hav thousands of young men made shipwreck of their lives.

JOSIAH GILBERT HOLLAND.

THE THINKER.

WHAT is the hardest task in the world? T think. I would put myself in the attitud to look in the eye of an abstract truth, an I cannot. I blench and withdraw on thi side and that. I seem to know what he meant, wh said, "No man can see God face to face, and live.' For example, a man explores the basis of civil govern ment. Let him intend his mind without respite without rest, in one direction. His best heed lon time avails him nothing. Yet thoughts are flittin before him. We all but apprehend, we dimly fore bode the truth. We say, I will walk abroad, and th truth will take form and clearness to me. We g forth, but cannot find it. It seems as if we needed only the stillness and composed attitude of the library, to seize the thought. But we come in, and are as far from it as at first. Then, in a moment, and unannounced, the truth appears. A certain wandering light appears, and is the distinction, the principle, we wanted. But the oracle comes, because we had previously laid siege to the shrine. It seems as if the law of the intellect resembles that law of nature by which we now inspire, now expire, the breath by which the heart now draws in, now hurls out the blood: the law of undulation. So now you must labor with your brains, and now you must forbear your activity and see what the great soul showeth.

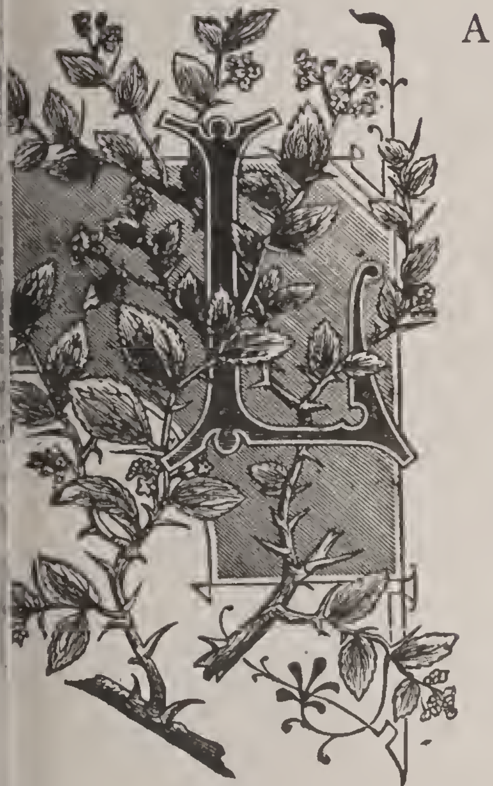
RALPH WALDO EMERSON.

THE CROWN OF GENIUS:

OR

TRIBUTES TO CELEBRATED PERSONS.

GEORGE WASHINGTON.



LAND of the West! though passing brief the record of thine age,
Thou hast a name that darkens all on history's wide page!
Let all the blasts of fame ring out—thine shall be loudest far:
Let others boast their satellites—thou hast the planet star.

Thou hast a name whose characters of light shall ne'er depart;
'Tis stamped upon the dullest brain, and warms the coldest heart;
A war-cry fit for any land where freedom's to be won,
Land of the West! it stands alone—it is thy Washington!

Rome had its Cæsar, great and brave; but stain was on his wreath:
He lived the heartless conqueror, and died the tyrant's death.
France had its Eagle; but his wings, though lofty they might soar,
Were spread in false ambition's flight, and dipped in murder's gore.

Those hero-gods, whose mighty sway would fain have chained the waves—
Who flashed their blades with tiger zeal, to make a world of slaves—
Who, though their kindred barred the path, still fiercely waded on—
Oh, where shall be *their* "glory" by the side of Washington?

He stood the firm, the calm, the wise, the patriot and sage;
He showed no deep avenging hate—no burst of despot rage.
He stood for liberty and truth, and dauntlessly led on,
Till shouts of victory gave forth the name of Washington.

He saved his land, but did not lay his soldier trappings down
To change them for the regal vest, and don a kingly crown;
Fame was too earnest in her joy—too proud of such a son—
To let a robe and title mask a noble Washington.

Eliza Cook.

NAPOLEON AND THE SAILOR.

A TRUE STORY.

NAPOLEON'S banners at Boulogne
Armed in our island every freeman,
His navy chanced to capture one
Poor British seaman.

hey suffered him—I know not how—
Unprisoned on the shore to roam;
nd aye was bent his longing brow
On England's home.

is eye, methinks, pursued the flight
Of birds to Britain half-way over,
ith envy, they could reach the white
Dear cliffs of Dover.

stormy midnight watch, he thought,
Than this sojourn would have been dearer,
If but the storm his vessel brought
To England nearer.

At last, when care had banished sleep,
He saw one morning—dreaming—doating,
An empty hogshead from the deep
Come shoreward floating;

He hid it in a cave, and wrought
The livelong day laborious; lurking
Until he launched a tiny boat
By mighty working.

Heaven help us! 'twas a thing beyond
Description wretched: such a wherry
Perhaps ne'er ventured on a pond,
Or crossed a ferry.

For ploughing in the salt sea-field,
It would have made the boldest shudder;
Untarred, uncompassed, and unkeeled,
No sail—no rudder.

From neighboring woods he interlaced
His sorry skiff with wattled willows;
And thus equipped he would have passed
The foaming billows—

But Frenchmen caught him on the beach,
His little Argo sorely jeering;
Till tidings of him chanced to reach
Napoleon's hearing.

With folded arms Napoleon stood,
Serene alike in peace and danger;
And in his wonted attitude,
Addressed the stranger:—

"Rash man that wouldst yon channel pass
On twigs and staves so rudely fashioned;
Thy heart with some sweet British lass
Must be impassioned."

"I have no sweetheart," said the lad;
"But—absent long from one another—
Great was the longing that I had
To see my mother."

"And so thou shalt," Napoleon said,
"Ye've both my favor fairly won;
A noble mother must have bred
So brave a son."

He gave the tar a piece of gold,
And with a flag of truce commanded
He should be shipped to England Old,
And safely landed

Our sailor oft could scantly shift
To find a dinner plain and hearty;
But never changed the coin and gift
Of Bonaparte.

Thomas Campbell.

THE PORTRAIT OF SHAKESPEARE.

THIS figure that thou here seest put,
It was for gentle Shakespeare cut,
Wherein the graver had a strife
With nature, to outdo the life:
O could he but have drawn his wit,
As well in brass, as he hath hit
His face; the print would then surpass
All that was ever writ in brass:
But since he cannot, reader, look,
Not on his picture, but his book.

Ben Jonson.

MARY MORISON.

O MARY, at thy window be!
It is the wished, the trysted hou
Those smiles and glances let me se
That make the miser's treasure p
How blithely wad I bide the stoure,
A weary slave frae sun to sun,
Could I the rich reward secure—
The lovely Mary Morison.

Yestreen when to the trembling string
The dance gaed through the lighted ha
To thee my fancy took its wing—
I sat, but neither heard nor saw;
Though this was fair, and that was braw
And yon the toast of a' the town,
I sighed, and said amang them a',
"Ye are na Mary Morison."

O Mary, canst thou wreck his peace
Wha for thy sake wad gladly dee?
Or canst thou break that heart of his,
Whase only faut is loving thee?
If love for love thou wilt na gie,
At least be pity to me shown;
A thought ungentle canna be
The thought o' Mary Morison.

Robert Burn

CHARLES DICKENS.

We would meet and welcome thee,
Preacher of humanity:
Welcome fills the throbbing breast
Of the sympathetic West.

W. H. Venabl

ADAMS AND JEFFERSON.

NO, fellow-citizens, we dismiss not Ac and Jefferson to the chambers of fo fulness and death. What we adm and prized, and venerated in them can *never* nor, dying, be forgotten. I had almost said they are now beginning to live—to live that of unimpaired influence, of unclouded fam unmingled happiness, for which their talents services were destined. They were of the s few, the least portion of whose life dwells in physical existence; whose hearts have wat while their senses slept; whose souls have gr up into a higher being; whose pleasure is to be ful; whose wealth is an unblemished reputat who respire the breath of honorable fame; have deliberately and consciously put wha called life to hazard, that they may live in hearts of those who come after. Such me not, *can* not die.

Edward Everet

VANDERBILT IS DEAD.

THE news comes whispering o'er the wire,
Vanderbilt is dead.
The press rolls out the message dire,
Vanderbilt is dead.
And the newsboys cry along the street,
Through the driving storm and wintry sleet,
Vanderbilt is dead.

A king dethroned sleeps low in death,
Vanderbilt is dead.
The rich men speak with bated breath,
Vanderbilt is dead.
And the clanging trains go out to-night
O'er the icy rails in a ghostly flight,
Vanderbilt is dead.

The palace grand is now a tomb,
Vanderbilt is dead.
Its splendors grand are veiled with gloom,
Vanderbilt is dead.
Where joy was known the mourners weep,
Where the laugh was heard is sorrow deep,
Vanderbilt is dead.

Sleep on, O King, in thy royal bed,
Vanderbilt is dead.
The wealth of the world doth crown thy head,
Vanderbilt is dead.
Thy sigh is o'er, thy deeds are done,
And God shall judge them, one by one—
Vanderbilt is dead.

SHERMAN D. RICHARDSON.

GEORGE WHITEFIELD.

HE loved the world that hated him; the tear
That dropped upon his Bible was sincere;
Assailed by scandal and the tongue of strife,
is only answer was a blameless life;
d he that forged and he that threw the dart
ad each a brother's interest in his heart.
ul's love of Christ and steadiness unbribed
ere copied close in him, and well transcribed.
e followed Paul; his zeal a kindred flame,
is apostolic charity the same.
ke him crossed cheerfully tempestuous seas,
rsaking country, kindred, friends and ease;
ke him he labored, and like him, content
bear it, suffered shame where'er he went.
ush, calumny! and write upon his tomb,
honest eulogy can spare thee room,
y deep repentance of thy thousand lies,
hich, aimed at him, have pierced the offended skies;
d say, Blot out my sin, confessed, deplored,
ainst thine image in thy saint, O Lord!

WILLIAM COWPER.

WILLIAM CULLEN BRYANT.

THE gifted author of "Thanatopsis" has adorned the literature of our later times. The poem just referred to was written by Bryant when a very young man, and we find in it the keynote to all his subsequent songs. The chief charm of his genius consists in a tender pensiveness, a moral melancholy, breathing over all his contemplations, dreams and reveries, even such as in the main are glad, and giving assurance of a pure spirit, benevolent to all human creatures, and habitually pious in the felt omnipresence of the Creator. His poetry overflows with natural religion—with what Wadsworth calls "The religion of the woods." PROFESSOR WILSON.

W. C. BRYANT.

THE OLD ADMIRAL.

ADMIRAL STEWART, U. S. N.

GONE at last,
That brave old hero of the past!
His spirit has a second birth,
An unknown, grander life;
All of him that was earth
Lies mute and cold,
Like a wrinkled sheath and old
Thrown off forever from the shimmering blade
That has good entrance made
Upon some distant, glorious strife.

From another generation,
A simpler age, to ours Old Ironsides came;
The morn and noontide of the nation
Alike he knew, nor yet outlived his fame—
O, not outlived his fame!

The dauntless men whose service guards our shore
  Lengthen still their glory-roll
  With his name to lead the scroll,
As a flagship at her fore
  Carries the Union, with its azure and the stars,
Symbol of times that are no more
  And the old heroic wars.

He was the one
Whom death had spared alone
  Of all the captains of that lusty age,
Who sought the foeman where he lay,
On sea or sheltering bay,
  Nor till the prize was theirs repressed their rage.
They are gone—all gone:
  They rest with glory and the undying powers;
  Only their name and fame, and what they saved, are ours!

It was fifty years ago,
  Upon the Gallic Sea,
  He bore the banner of the free,
And fought the fight whereof our children know—
  The deathful, desperate fight!
  Under the fair moon's light
The frigate squared, and yawed to left and right.
  Every broadside swept to death a score!
Roundly played her guns and well, till their fiery ensigns fell,
Neither foe replying more.
All in silence, when the night-breeze cleared the air,
  Old Ironsides rested there,
Locked in between the twain, and drenched with blood.
  Then homeward, like an eagle with her prey!
  O, it was a gallant fray—
  That fight in Biscay Bay!
Fearless the captain stood, in his youthful hardihood:
  He was the boldest of them all,
  Our brave old Admiral!

And still our heroes bleed,
Taught by that olden deed.
  Whether of iron or of oak
The ships we marshal at our country's need,
  Still speak their cannon now as then they spoke;
Still floats our unstruck banner from the mast
  As in the stormy past.

Lay him in the ground:
  Let him rest where the ancient river rolls;
Let him sleep beneath the shadow and the sound
  Of the bell whose proclamation, as it tolls,
Is of freedom and the gift our fathers gave.
  Lay him gently down:
  The clamor of the town
Will not break the slumbers deep, the beautiful ripe sleep,
  Of this lion of the wave,
  Will not trouble the old Admiral in his grave.
Earth to earth his dust is laid.
Methinks his stately shade
  On the shadow of a great ship leaves the sho ;
Over cloudless western seas
Seeks the far Hesperides,
  The islands of the blest,
Where no turbulent billows roar—
  Where is rest.
His ghost upon the shadowy quarter stands
Nearing the deathless lands.
  There all his martial mates, renewed and stron,
  Await his coming long.
  I see the happy Heroes rise
  With gratulation in their eyes:
"Welcome, old comrade," Lawrence cries;
"Ah, Stewart, tell us of the wars!
Who win the glory and the scars?
How floats the skyey flag—how many stars?
  Still speak they of Decatur's name,
  Of Bainbridge's and Perry's fame?
  Of me, who earliest came?
Make ready, all:
Room for the Admiral!
  Come, Stewart, tell us of the wars!"

E. C. Stedman.

ROBERT SOUTHEY.

He said (I only give the heads)—he said
  He meant no harm in scribbling; 't was his way
Upon all topics; 't was, besides, his bread,
  Of which he buttered both sides; 't would delay
Too long the assembly (he was pleased to dread,
  And take up rather more time than a day,
To name his works—he would but cite a few—
"Wat Tyler"—"Rhymes on Blenheim"
  "Waterloo."

He had written praises of a regicide;
  He had written praises of all kings whatever
He had written for republics far and wide,
  And then against them bitterer than ever;
For pantisocracy he once had cried
  Aloud, a scheme less moral than 't was cleve
Then grew a hearty anti-jacobin—
Had turned his coat—and would have turned
  skin.

He had sung against all battles, and again
  In their high praise and glory; he had callec
Reviewing "the ungentle craft," and then
  Become as base a critic as e'er crawled—
Fed, paid, and pampered by the very men
  By whom his muse and morals had been maule
He had written much blank verse, and blan
  prose,
  And more of both than anybody knows.

Lord Byron

TO THE MEMORY OF BEN JONSON.

THE muse's fairest light in no dark time,
The wonder of a learnéd age the line
Which none can pass; the most proportioned wit—
o nature, the best judge of what was fit;
he deepest, plainest, highest, clearest pen;
he voice most echoed by consenting men;
he soul which answered best to all well said
y others, and which most requital made;
uned to the highest key of ancient Rome,
eturning all her music with his own;
n whom, with nature, study claimed a part,
nd yet who to himself owed all his art:
Iere lies Ben Johnson! every age will look
Vith sorrow here, with wonder on his book.

John Cleveland.

HENRY KIRKE WHITE.

UNHAPPY White! while life was in its spring,
And thy young muse just waved her joyous wing,
he spoiler came, and all thy promise fair
Ias sought the grave, to sleep forever there.
what a noble heart was there undone,
Vhen science self-destroyed her favorite son!
es, she too much indulged thy fond pursuit;
he sowed the seeds, but death has reaped the fruit.
'T was thine own genius gave the fatal blow,
nd helped to plant the wound that laid thee low.

o the struck eagle, stretched upon the plain,
Io more through rolling clouds to soar again,
iewed his own feather on the fatal dart,
nd winged the shaft that quivers at his heart.

een were his pangs; but keener far to feel
Ie nursed the pinion which impelled the steel,
Vhile the same plumage that had warmed his nest
rank the last life-drop from his bleeding breast!

Lord Byron.

ITALY'S KING.

O Victor Emmanuel, the King,
The sword be for *thee*, and the deed;
And nought for the alien, next spring,
Nought for Hapsburg and Bourbon agreed;
But, for us, a great Italy freed,
With a hero to head us—our King.

Elizabeth B. Browning.

TO THE MEMORY OF HOOD.

Here lies a poet. Stranger, if to thee
His claim to memory be obscure,
If thou wouldst learn how truly great was he,
Go, ask it of the poor.

THE POET CAMPBELL.

BEST known by his remarkable poem, "The Pleasures of Hope," Campbell's fame rests upon other productions which do not seem to lose their charm. He wrote in the taste of the time, yet with no small degree of originality, and he handled topics of immediate though not ephemeral interest. His battle-pieces on names and subjects known to all had the true popular ring, a bold tramp of metre.

THOMAS CAMPBELL.

Little matters how Campbell managed to produce his most inspiring poems. He had the touch, that is what is certain. Many of his short poems had the unmistakable stamp of the artist upon them. Compared as lyrical writers, Campbell seems to have a finer touch than Scott or Byron, the former of whom is apt to be rough, the latter turgid. But in whatever rank one or another reader may place the poetry of Campbell all will agree that he made genuine additions to English literature. "It is on his lyrics," says Professor Aytoun, "that the future reputation of Campbell must principally rest. They have taken their place, never to be disturbed, in the popular heart; and, until the language in which they are written perishes, they are certain to endure."

William Allingham.

THOMAS HOOD.

As a poet and humorist Hood has touched the universal heart. His two productions, "Song of the Shirt" and "Bridge of Sighs" are sufficient to give him immortal fame, even if he had written nothing else. It has been well said that the predominant characteristic of Hood's genius are humorous fancies grafted upon melancholy impressions. Yet the term "grafted" is hardly strong enough. Hood appears by natural bent and permanent habit of mind to have seen and sought for ludicrousness under all conditions; it was the first thing that struck him.

THOMAS HOOD.

On the other hand, his nature being poetic, his sympathies acute, and the condition of his life morbid, he very frequently wrote in a tone of deep melancholy feeling, and was a master both of his own art and of the reader's emotion. Sometimes, not very often, we are allowed to reach the close of a poem of his without having our attention jogged and called off by something grotesque, and then we feel how exquisite a poetic sense and choice a cunning of hand were his. On the whole we can pronounce him the finest English poet between the generation of Shelley and the generation of Tennyson. W. M. Rossetti.

THE LAST HOURS OF SOCRATES.

Socrates was the reverse of a skeptic. No man ever looked upon life with a more positive and practical eye. No man ever pursued his mark with a clearer perception of the road which he was traveling. No man ever combined, in like manner, the absorbing enthusiasm of a missionary, with the acuteness, the originality, the inventive resources, and the generalizing comprehension of a philosopher. And yet this man was condemned to death—condemned by a hostile tribunal of more than five hundred citizens of Athens, drawn at hazard from all classes of society. A majority of six turned the scale, in the most momentous trial that, up to that time, the world had witnessed. And the vague charges on which Socrates was condemned were, that he was a vain babbler, a corrupter of youth, and a setter-forth of strange gods!

It would be tempting to enlarge on the closing scene of his life—a scene which Plato has invested with such immortal glory: on the affecting farewell to the Judges; on the long thirty days which passed in prison before the execution of the verdict; on his playful equanimity, amid the uncontrollable emotions of his companions; on the gathering in of that solemn evening, when the fading of the sunset hues on the tops of the Athenian hills was the signal that the last hour was at hand; on the introduction of the fatal hemlock, the immovable countenance of Socrates, the firm hand, and then the burst of frantic lamentation from all his friends, as, with his habitual ease and cheerfulness, he drained the cup to its dregs; then the solemn silence enjoined by himself; the pacing to and fro; the strong religious persuasions attested by his last words; the cold palsy of the poison creeping from the extremities to the heart; the gradual torpor ending in death! But I must forbear.

O for a modern spirit like his! O for one hour of Socrates! O for one hour of that voice whose questioning would make men see what they knew, and what they did not know; what they meant, and what they only *thought* they meant; what they believed in *truth*, and what they only believed in *name;* wherein they *agreed*, and wherein they *differed*. That voice is, indeed, silent; but there is a voice in each man's heart and conscience which, if we will, Socrates has taught us to use rightly. That voice still enjoins us to give to ourselves a reason for the hope that is in us—both hearing and asking questions. It tells us that the fancied repose which self inquiry disturbs is more than compensated by the real repose which it gives; that wise questioning is the half of knowledge; and that a life without self-examination is no life at all.

GENERAL GRANT.

As one by one withdraw the lofty actors
From that great play on history's stage eterne,
That lurid, partial act of war and peace—of old and new contending,
ught out through wrath, fears, dark dismays, and many a long suspense!
l past—and since, in countless graves receding, mellowing,
ctor's and vanquished—Lincoln's and Lee's—now thou with them,
an of the mighty days—and equal to the days!
ou from the prairies! tangled and many-veined and hard has been thy part,
admiration has it been enacted!

d still shall be—resume again, thou hero heart!
rengthen to firmest day O rosy dawn of hope!
ou dirge I started first, to joyful shout reverse—and thou, O grave,
ait long and long!

WALT WHITMAN.

TO J. G. WHITTIER ON HIS SEVENTIETH BIRTHDAY.

SNOW-BOUND for earth, but summer-souled for thee,
Thy natal morning shines:
Hail, friend and poet. Give thy hand to me,
And let me read its lines!

For skilled in fancy's palmistry am I,
When years have set their crown;
When life gives light to read its secrets by,
And deed explains renown.

So, looking backward from thy seventieth year
On service grand and free,
The pictures of the spirit's past are clear,
And each interprets thee.

I see thee, first, on hills our Aryan sires
In time's lost morning knew,
Kindling as priest the lonely altar-fires
That from earth's darkness grew.

Then wise with secrets of Chaldæan lore,
In high Akkadian fane;
Or pacing slow by Egypt's river shore,
In Thothmes' glorious reign.

I hear thee, wroth with all iniquities
That Judah's kings betrayed,
Preach from Ain-Jidi's rock thy God's decrees,
Or Mamre's terebinth shade.

And, ah! most piteous vision of the past,
Drawn by thy being's law,
I see thee, martyr, in the arena cast,
Beneath the lion's paw.

Yet, afterwards, how rang thy sword upon
The paynim helm and shield!
How shone with Godfrey, and at Askalon,
Thy white plume o'er the field.

Strange contradiction! where the sand waves spread
The boundless desert sea,
The Bedouin spearmen found their destined head,
Their dark-eyed chief—in thee!

And thou wert friar in Cluny's saintly cell,
And Skald by Norway's foam,
Ere fate of poet fixed thy soul to dwell
In this New England home.

Here art thou poet—more than warrior, priest;
And here thy quiet years
Yield more to us than sacrifice or feast,
Or clash of swords or spears.

The faith that lifts, the courage that sustains,
These thou wert sent to teach:
Hot blood of battle, beating in thy veins,
Is turned to gentle speech.

Not less, but more, than others hast thou striven;
Thy victories remain:
The scars of ancient hate, long since forgiven,
Have lost their power to pain.

Apostle pure of freedom and of right,
Thou hast thy one reward;
Thy prayers were heard and flashed upon thy sight
The coming of the Lord!

Now, sheathed in myrtle of thy tender songs,
Slumbers the blade of truth;
But age's wisdom, crowning thee, prolongs
The eager hope of youth.

Another line upon thy hand I trace
All destinies above:
Men know thee most as one that loves his race,
And bless thee with their love!

BAYARD TAYLOR.

ON THE DEATH OF PRESIDENT TAYLOR.

WEEP not for him! The Thracians wisely gave
Tears to the birth-couch, triumph to the grave.
Weep not for him! Go, mark his high career;
It knew no shame, no folly, and no fear.
Nurtured to peril, lo! the peril came,
To lead him on, from field to field, to fame.
Weep not for him whose lustrous life has known
No field of fame he has not made his own!

In many a fainting clime, in many a war,
Still bright-browed Victory drew the patriot's car.
Whether he met the dusk and prowling foe
By oceanic Mississippi's flow;
Or where the Southern swamps, with steamy breath,
Smite the worn warrior with no warrior's death!
Or where, like surges on the rolling main,
Squadron on squadron sweep the prairie plain—
Dawn—and the field the haughty foe o'erspread
Sunset—and Rio Grandé's waves ran red!
Or where, from rock-ribbed safety, Monterey
Frowns death, and dares him to the unequal fray;
Till crashing walls and slippery streets bespeak
How frail the fortress where the heart is weak;
How vainly numbers menace, rocks defy,
Men sternly knit, and firm to do or die;—
Or where on thousand thousands crowding rush,
(Rome knew not such a day) his ranks to crush,
The long day paused on Buena Vista's height,
Above the cloud with flashing volleys bright,
Till angry freedom, hovering o'er the fray,
Swooped down, and made a new Thermopylæ;—
In every scene of peril and of pain,
His were the toils, his country's was the gain.
From field to field—and all were nobly won—
He bore, with eagle flight, her standard on:
New stars rose there—but never star grew dim
While in *his* patriot grasp. Weep not for him.

He was a spirit simple, grand and pure,
Great to conceive to do, and to endure;
Yet the rough warrior was, in heart, a child,
Rich in love's affluence, merciful and mild.
His sterner traits, majestic and antique,
Rivalled the stoic Roman or the Greek;
Excelling both, he adds the Christian name,
And Christian virtues make it more than fame.
To country, youth, age, love, life—all were given
In death, she lingered between him and heaven;
Thus spake the patriot, in his latest sigh—
"MY DUTY DONE—I DO NOT FEAR TO DIE!"

ROBERT T. CONRAD.

WILLIAM PENN.

PENN, despairing of relief in Europe, bent the whole energy of his mind to accomplish the establishment of a free government in the New World. For that "heavenly end," he was prepared by the severe discipline of life, and the love, without dissimulation, which formed the basis of his character. The sentiment of cheerful humanity was irrepressibly strong in his bosom; as with John Eliot and Roger Williams, benevolence gushed prodigally from his ever-flowing heart; and when, in his late old age, his intellect was impaired, and his reason prostrated by apoplexy, his sweetness of disposition rose serenely over the clouds of disease.

Possessing an extraordinary greatness of mind, vast conceptions, remarkable for their universality and precision, and "surpassing in speculative endowments;" conversant with men, and books and governments, with various languages, and the f[illegible] of political combinations, as they existed in England and France, in Holland, and the principalities and free cities of Germany, he yet sought the source of wisdom in his own soul. Human by nature and by suffering; familiar with the royal family; intimate with Sunderland and Sydney; acquainted with Russel, Halifax, Shaftesbury, and Buckingham; as a member of the Royal Society the peer of Newton and the great scholars of his age—he valued the promptings of a free mind more than the awards of the learned, and reverenced the single-minded sincerity of the Nottingham shepherd more than the authority of colleges and the wisdom of philosophers.

GEORGE BANCROFT.

CLEOPATRA.

THE barge she sat in, like a burnished throne,
Burnt on the water: the poop was beaten gold;
Purple the sails, and so perfumed that
The winds were love-sick with them: the oars were silver;
Which to the tune of flutes kept stroke and made
The water, which they beat, to follow faster,
As amorous of their strokes. For her own person,
It beggared all description: she did lie
In her pavilion (cloth of gold, of tissue),
O'erpicturing that Venus, where we see
The fancy out-work nature: on each side her
Stood pretty dimpled boys, like smiling Cupids,
With divers-colored fans, whose wind did seem
To glow the delicate cheeks which they did cool,
And what they undid, did.

Her gentlewomen, like the Nereides,
So many mermaids, tended her i' the eyes,
And made their bends adornings: at the helm
A seeming mermaid steers; the silken tackle
Swell with the touches of those flower-soft hands,
That rarely frame the office. From the barge
A strange invisible perfume hits the sense
Of the adjacent wharfs. The city cast
Her people out upon her; and Antony,
Enthroned in the market-place, did sit alone,
Whistling to the air; which, but for vacancy,
Had gone to gaze on Cleopatra too,
And made a gap in nature.

Upon her landing, Antony sent to her,
Invited her to supper: she replied,
It should be better he became her guest;
Which she entreated: our courteous Antony,
Whom ne'er the word of "No," woman hear speak,

Being barbered ten times o'er, goes to the feast;
And, for his ordinary, pays his heart,
For what his eyes eat only.

William Shakespeare.

PRESCOTT'S METHOD OF LIVING.

THAT Mr. Prescott, under his disheartening infirmities—I refer not only to his imperfect sight, but to the rheumatism from which he was seldom wholly free—should, at the age of five and twenty or thirty, with no help but this simple apparatus, have aspired to the character of an historian dealing with events that happened in times and countries far distant from his own, and that are recorded chiefly in foreign languages and by authors whose conflicting testimony was often to be reconciled by laborious comparison, is a remarkable fact in literary history. It is a problem the solution of which was, I believe, never before undertaken; certainly never before accomplished. Nor do I conceive that he himself could have accomplished it, unless to his uncommon intellectual gifts had been added great animal spirits, a strong, persistent will, and a moral courage which was to be daunted by no obstacle that he might deem it possible to remove by almost any amount of effort.

That he was not insensible to the difficulties of his undertaking, we have partly seen, as we have witnessed how his hopes fluctuated while he was struggling through the arrangements for beginning to write his "Ferdinand and Isabella," and, in fact, during the whole period of its composition. But he showed the same character, the same fertility of resource, every day of his life, and provided, both by forecast and self-sacrifice, against the embarrassments of his condition as they successively presented themselves.

The first thing to be done, and the thing always to be repeated day by day, was to strengthen, as much as possible, what remained of his sight, and at any rate, to do nothing that should tend to exhaust its impaired powers. In 1821, when he was still not without some hope of its recovery, he made this memorandum: "I will make it my principal purpose o restore my eye to its primitive vigor, and will do nothing habitually that can seriously njure it." To this end he regulated his life with an exactness that I have never known equalled. Especially in whatever related to the daily distribution of his time, whether in regard o his intellectual labors, to his social enjoyments, or to the care of his physical powers, including his diet, he was severely exact—managing himself, ndeed, in this last respect, under the general directions of his wise medical adviser, but carrying out these directions with an ingenuity and idelity all his own.

G. H. Ticknor.

TO COLE, THE PAINTER, DEPARTING FOR EUROPE.

THINE eyes shall see the light of distant skies:
Yet, Cole! thy heart shall bear to Europe's strand
A living image of thy native land,
Such as on thine own glorious canvas lies;
Lone lakes—savannas where the bison roves—

W. H. PRESCOTT.

Rocks rich with summer garlands—solemn streams,
Skies, where the desert eagle wheels and screams—
Spring bloom and autumn blaze of boundless groves.
Fair scenes shall greet thee where thou goest—fair,
But different—everywhere the trace of men.
Paths, homes, graves, ruins, from the lowest glen
To where life shrinks from the fierce Alpine air,
Gaze on them, till the tears shall dim thy sight,
But keep that earlier, wilder image bright.

W. C. Bryant.

THE SEMINOLE'S DEFIANCE.

BLAZE, with you serried columns! I will not bend the knee;
The shackle ne'er again shall bind the arm which now is free!
I've mailed it with the thunder, when the tempest muttered low.
And where it falls, ye well may dread the lightning of its blow.
I've scared you in the city; I've scalped you on the plain;
Go, count your chosen where they fell beneath my leaden rain!
I scorn your proffered treaty; the pale-face I defy;
Revenge is stamped upon my spear, and "blood" my battle-cry!

Some strike for hope of booty; some to defend their all;—
I battle for the joy I have to see the white man fall.
I love, among the wounded, to hear his dying moan,
And catch, while chanting at his side, the music of his groan.
Ye've trailed me through the forest; ye've tracked me o'er the strea
And struggling through the everglade your bristling bayonets gleam
But I stand, as should the warrior, with his rifle and his spear;
The scalp of vengeance still is red, and warns you—"Come not here

Think ye to find my household?—I gave it to the fire.
My tawny household do ye seek?—I am a childless sire.
But, should ye crave life's nourishment, enough I have, and good;
I live on hate—'tis all my bread; yet light is not my food.
I loath you with my bosom! I scorn you with mine eye!
And I'll taunt you with my latest breath, and fight you till I die!
I ne'er will ask for quarter, and I ne'er will be your slave;
But I'll swim the sea of slaughter till I sink beneath the wave!

G. W. PATTON

FATE OF CHARLES THE TWELFTH.

ON what foundation stands the warrior's pride,
How just *his* hopes, let Swedish Charles decide!
A frame of adamant, a soul of fire.
No dangers fright him, and no labors tire;
O'er love, o'er fear, extends his wide domain,
Unconquered lord of pleasure and of pain;
No joys to him pacific sceptres yield,
War sounds the trump, he rushes to the field;
Behold surrounding kings their powers combine,
And one capitulate, and one resign;
Peace courts his hand, but spreads her charms in vain,
"Think nothing gained," he cries, "till naught remain;
On Moscow's walls till Gothic standards fly,
And all be mine beneath the polar sky."

The march begins in military state,
And nations on his eye suspended wait;
Stern famine guards the solitary coast,
And winter barricades the realms of frost;
He comes—nor want nor cold his course delay;
Hide, blushing glory, hide Pultowa's day!
The vanquished hero leaves his broken bands,
And shows his miseries in distant lands;
Condemned a needy suppliant to wait,
While ladies interpose, and slaves debate.
But did not chance at length her error mend?
Did no subverted empire mark his end?
Did rival monarchs give the fatal wound?
Or hostile millions press him to the ground?
His fall was destined to a barren strand,
A petty fortress, and a dubious hand;
He left the name, at which the world grew pal
To point a moral, or adorn a tale!

SAMUEL JOHNSO

WENDELL PHILLIPS.

ALONG the streets one day with that si
tread
He walked a living king—then "H
dead,"
The whisper flew from lip to lip, while still
Sounding within their ears, the echoing thrill
Of his magician's voice we seemed to hear,
In notes of melody ring near and clear.

So near, so clear, men cried, "It cannot be!
It was but yesterday he spoke to me:
But yesterday we saw him move along,
His head above the crowd, swift-paced and str
But yesterday his plan and purpose sped,
It cannot be to-day that he is dead."

A moment thus, half-dazed, men met and spc
When first the sudden news upon them broke
A moment more, with sad acceptance turned
To face the bitter truth that they had spurne

riends said through tears, "How empty seems
the town."
nd warning critics laid their weapons down.

[e had his faults, they said, but they were faults
f head and not of heart—his sharp assaults
lung seeming heedless from his quivering bow,
nd needless striking either friend or foe,
'ere launched with eyes that saw not foe or friend,
ut only shining far, some goal or end.

hat compassed once, should bring God's saving
grace
o purge and purify the human race—
he measure that meted out he took,
nd blow for blow received without a look,
'ithout a sigh of conscious hurt or hate,
o stir the tranquil calmness of his state.

orn on the heights and in the purple bred,
e chose to walk the lowly ways instead,
hat he might lift the wretched and defend
he rights of those who languished for a friend,
many years he spent in listening
these sad cries of wrong and suffering.

Nora Perry.

MARTIN LUTHER.

N the solemn loneliness, in which Luther found himself, he called around him not so much the masters of the Greek and Latin wisdom rough the study of the ancient languages, as he d the mass of his own countrymen, by his trans- tion of the Bible. It would have been a matter tardy impression and remote efficacy, had he ne no more than awake from the dusty alcoves of e libraries the venerable shades of the classic achers. He roused up a population of living, ntient men, his countrymen, his brethren. He ght have written and preached in Latin to his ing day, and the elegant Italian scholars, cham- ons of the church, would have answered him in tin better than his own; and with the mass of e people, the whole affair would have been a con- st between angry and loquacious priests. "Awake antiquity from the sleep of the libraries!" He awoke all Germany and half Europe from e scholastic sleep of an ignorance worse than ath. He took into his hands not the oaten pipe the classic muse; he moved to his great work, t

> * * * To the Dorian mood
> Of flutes and soft recorders :—

e grasped the iron trumpet of his mother tongue the good old Saxon from which our own is de- ended, the language of noble thought and high solve—and blew a blast that shook the nations m Rome to the Orkneys. Sovereign, citizen, d peasant, started at the sound; and, in a few ort years, the poor monk, who had begged his bread for a pious canticle in the streets of Eisenach—no longer friendless—no longer solitary—was sustained by victorious armies, countenanced by princes, and, what is a thousand times more precious than the brightest crown in Christendom, revered as a sage, a benefactor, and a spiritual parent, at the firesides of millions of his humble and grateful countrymen.

Edward Everett.

ROBERT BURNS.

HIS is that language of the heart
In which the answering heart would speak,
Thought, word, that bids the warm tear start,
Or the smile light the cheek;

And his that music to whose tone
The common pulse of man keeps time,
In cot or castle's mirth or moan,
In cold or sunny clime.

Through care and pain and want and woe,
With wounds that only death could heal,
Tortures the poor alone can know,
The proud alone can feel,

He kept his honesty and truth,
His independent tongue and pen,
And moved, in manhood as in youth,
Pride of his fellow-men.

Strong sense, deep feeling, passions strong,
A hate of tyrant and of knave,
A love of right, a scorn of wrong,
Of coward and of slave;

A kind, true heart, a spirit high,
That could not fear and would not bow,
Were written in his manly eye
And on his manly brow.

Praise to the bard! his words are driven,
Like flower-seeds by the far winds sown,
Where'er beneath the sky of heaven
The birds of fame have flown.

Praise to the man! a nation stood
Beside his coffin with wet eyes—
Her brave, her beautiful, her good—
As when a loved one dies.

And still, as on his funeral day,
Men stand his cold earth-couch around.
With the mute homage that we pay
To consecrated ground.

And consecrated ground it is—
The last, the hallowed home of one
Who lives upon all memories,
Though with the buried gone.

Fitz-Greene Halleck.

COPERNICUS.

HE is dying, but he leaves a glorious truth as his dying bequest to the world. He bids the friend who has brought it place himself between the window and his bedside, that the sun's rays may fall upon the precious volume, and he may behold it once more before his eye grows dim. He looks upon it, takes it in his hands; presses it to his breast, and expires.

But no, he is not wholly gone. A smile lights up his dying countenance; a beam of returning intelligence kindles in his eye; his lips move; and the friend who leans over him can hear him faintly murmur the beautiful sentiments which the Christian lyrist of a later age has so finely expressed in verse:

"Ye golden lamps of heaven, farewell, with all your feeble light;
Farewell, thou ever-changing moon, pale empress of the night;
And thou, effulgent orb of day, in brighter flames arrayed;
My soul, which springs beyond thy sphere, no more demands thy aid.
Ye stars are but the shining dust of my divine abode,
The pavement of those heavenly courts where I shall reign with God."

So died the great Columbus of the heavens.

EDWARD EVERETT.

CHARLES LAMB.

LAMB'S style runs pure and clear, though it may often take an underground course, or be conveyed through old-fashioned conduits. He delights to dwell on that which is fresh to the eye of memory; he yearns after d covets what soothes the frailty of human nat e. That touches him most nearly which is withdra n to a certain distance, which verges on the bord rs of oblivion. The streets of London are his fa y-land, teeming with wonder, with life and inte st to his retrospective glance, as it did to the ea er eye of childhood; he has contrived to weave ts tritest traditions into a bright and endless roman e.

As an essayist, Lamb will be remembered w h the best of his class. He has wisdom and wit of the highest order, exquisite humor, a genuine a d

CHARLES LAMB.

cordial vein of pleasantry, and the most hea touching pathos. His thoughts are always own. Even when his words seem cast into very mould of others, the perfect originality his thinking is felt and acknowledged. An stance of this is his delightful essay on "Ro Pig"—an essay that is fairly succulent with juices of the oven, and is enough to tickle palate of even a man who is not fond of product of the farm-yard. The sweet stream thought bubbles and sparkles with witty fanc such as I do not remember to have elsewhere r with, except in Shakespeare.

WILLIAM HAZLITT.

THE PRINCESS CHARLOTTE.

WOE unto us, not her; for she sleeps we
The fickle reek of popular breath,
tongue
Of hollow counsel, the false oracle,
Which from the birth of monarchy hath run
Its knell in princely ears, till the o'erstung
Nations have armed in madness, the strange f

Which tumbles mightiest sovereigns, and hath
flung
Against their blind omnipotence a weight
Within the opposing scale, which crushes soon or
late—

These might have been her destiny; but no,
Our hearts deny it: and so young, so fair,
Good without effort, great without a foe;
But now a bride and mother,—and now *there!*
How many ties did that stern moment tear!
From thy sire's to his humblest subject's breast
Is linked the electric chain of that despair,
Whose shock was as an earthquake's, and
oppress
The land which loved thee so that none could
love thee best.

Lord Byron.

HENRY CLAY'S POPULARITY.

OF our public men of the sixty years preceding the war, Henry Clay was certainly the most shining figure. Was there ver a public man, not at the head of a state, so beloved as he? Who ever heard such cheers, o hearty, distinct, and ringing, as those which his name evoked? Men shed tears at his defeat, and women went to bed sick from pure sympathy with his disappointment. He could not ravel during the last thirty years of his life, but only make progresses. When he left his home the public seized him and bore him along over the land, the committee of one State passing him on to the committee of another, and the hurrahs of one town dying away as those of the next caught his ear. The country seemed to place all its resources at his disposal; all commodities sought his acceptance.

Passing through Newark once, he thoughtlessly ordered a carriage of a certain pattern: the same evening the carriage was at the door of his hotel in New York, the gift of a few Newark friends. It was so everywhere and with everything. His house became at last a museum of curious gifts. There was the counterpane made for him by a lady ninety-three years of age, and Washington's camp-goblet given him by a lady of eighty; there were pistols, rifles, and fowling-pieces enough to defend a citadel; and, among a bundle of walking-sticks, was one cut for him from a tree that shaded Cicero's grave. There were gorgeous prayer-books, and Bibles of exceeding magnitude and splendor, and silver-ware in great profusion.

On one occasion there arrived at Ashland the substantial present of twenty-three barrels of salt. In his old age, when his fine estate, through the misfortunes of his sons, was burdened with mortgages to the amount of thirty-thousand dollars, and other large debts weighed heavily upon his soul, and he feared to be compelled to sell the home of fifty years and seek a strange abode, a few old friends secretly raised the needful sum, secretly paid the mortgages and discharged the debts, and then caused the aged orator to be informed of what had been done, but not of the names of the donors.

"Could my life insure the success of Henry Clay, I would freely lay it down this day," exclaimed an old Rhode Island sea-captain on the morning of the Presidential election of 1844. Who has forgotten the passion of disappointment, the amazement and despair, at the result of that day's fatal work? Fatal we thought it then, little dreaming that, while it precipitated evil, it brought nearer the day of deliverance.

HENRY CLAY AT LEXINGTON, KY.

James Parton.

JOHN HOWARD.

THE prisons of Europe previous to Howard's great reformatory work almost surpassed description. They were dungeons without a ray of light to cheer. If human ingenuity had set itself to work to inflict the most abject misery upon condemned criminals it could not have achieved a greater success. Man was nothing more than a brute. There was no pity for his chains, no sympathy for his sorrows. The cold walls of his cell were no more unfeeling than the hearts of his judicial tormentors. One loud groan went up to heaven from every prison in Europe.

John Howard came. He was human, sympathetic, wise. He heard the moan of the prisoner; if he did not turn it into music he at least made it less dolorous. Howard's journeys through Great Britain and Europe were grander th triumphal marches. If the victims of the da dungeons could have been released for a mome they would have strewn palm-branches in his way. The sun rose upon a night of darkness. Uplifted eyes and broken hearts hailed the coming of John Howard, the prisoner's friend. Better to have the blessings of the poor and oppressed than to live in bronze and granite.

Never before had been heard such music—the clanking of chains stricken off by his half-omnipotent hand. A new era had dawned in civilization. Not that there was any effort to prevent the rigid exercise of justice, but the angel of pity, almost a stranger in the earth, bent down over the weak, the suffering, the abused, the doomed, and there was heaven in her eyes. HENRY DAVENPORT.

HENRY WADSWORTH LONGFELLOW.

MAN is the grief of those whose faith
Is bounded by the shores of death;
From out whose mists of doubt and gloom
No rainbow arches o'er the tomb
Where love's last tribute of a tear
Lies with dead flowers upon the bier.

O thou revered, beloved!—not yet,
With sob of bells, with eyes tear-wet,
With faltering pulses, do we lay
Thy greatness in the grave away;
Not Auburn's consecrated ground
Can hold the life that wraps thee round.

Still shall thy gentle presence prove
Its ministry of hope and love;
Thy tender tones be heard within
The story of Evangeline;
And by the fireside, midst the rest,
Thou oft shalt be a welcome guest.

Again the mystery will be clear;
The august Tuscan's shades appear;
Moved by thy impulse, we shall feel
New longings for thy high ideal;
And under all thy forms of art
Feel beatings of a human heart.

As in our dreams we follow thee
With longing eyes beyond the sea,
We see thee on some loftier height
Across whose trembling bridge of light
Our voices of the night are borne,
Clasp with white hand the stars of morn.

O happy poet! Thine is not
A portion of the common lot;
Thy works shall follow thee; thy verse
Shall still thy living thoughts rehearse;
The ages shall to thee belong—
An immortality of song.

FRANCIS F. BROWNE.

RANDOLPH OF ROANOKE.

OH, Mother Earth! upon thy lap
Thy weary ones receiving,
And o'er them, silent as a dream,
Thy grassy mantle weaving—
Fold softly in thy long embrace
That heart so worn and broken,
And cool its pulse of fire beneath
Thy shadows old and oaken.

Shut out from him the bitter word
And serpent hiss of scorning;
Nor let the storms of yesterday
Disturb his quiet morning.
Breathe over him forgetfulness
Of all save deeds of kindness,
And, save to smiles of grateful eyes,
Press down his lids in blindness.

There, where with living ear and eye
He heard Potomac's flowing,
And, through his tall, ancestral trees
Saw autumn's sunset glowing,
He sleeps—still looking to the west,
Beneath the dark wood shadow,
As if he still would see the sun
Sink down on wave and meadow.

Bard, sage, and tribune!—in himself
All moods of mind contrasting—
The tenderest wail of human woe,
The scorn like lightning blasting;
The pathos which from rival eyes
Unwilling tears could summon,
The stinging taunt, the fiery burst
Of hatred scarcely human!

Mirth, sparkling like a diamond-shower,
From lips of life-long sadness;
Clear picturings of majestic thought
Upon a ground of madness;
And over all, romance and song
A classic beauty throwing,
And laurelled Clio at his side
Her storied pages showing.

All parties feared him: each in turn
Beheld its schemes disjointed,
As right or left his fatal glance
And spectral finger pointed.
Sworn foe of cant, he smote it down
With trenchant wit, unsparing,
And, mocking, rent with ruthless hand
The robe pretence was wearing.

Too honest or too proud to feign
A love he never cherished,
Beyond Virginia's border line
His patriotism perished.
While others hailed in distant skies
Our eagle's dusky pinion,
He only saw the mountain bird
Stoop o'er his Old Dominion!

Still through each change of fortune strange,
Racked nerve, and brain all burning,
His loving faith in mother-land
Knew never shade of turning:
By Britain's lakes, by Neva's wave,
Whatever sky was o'er him,
He heard her rivers' rushing sound,
Her blue peaks rose before him.

J. G. WHITTIER.

HENRY WADSWORTH LONGFELLOW.

ONE of the greenest of laurels adorns the brow of this favo ite American poet, who, it has been said, is even mo extensively read and admired in England than at hom Many of his productions are as familiar in the homes of th people as the old-time almanac used to be in the homesteads our grandfathers.

Longfellow studied the principles of verbal melody, and rendered himself master of the mysterious affinities which exi between sound and sense, word and thought, feeling and expression. There is an aptitude, gracefulness and vivid beaut in many of his stanzas which at once impress the memory an win ear and heart. There is in the tone of his poetry little passion, but much quiet earnestness.

His ideas and metaphors are often striking and poetical, bu there is no affluence of imagery or wonderful glow of emotio such as take us captive in Byron or Shelley; the claim of Longfellow consists rather in the wise and tasteful use of his materials than in their richness and the originality. He illustrates the gentler themes of song, and pleads for justice, humanity, and particularly the beautiful, with a poet's deep conviction of their eternal claims upon the distinctive recognitio of the man.

THE GREAT SENATORS.

OUR great triumvirate—Clay, Webster, Calhoun—last appeared together in public life in the Senate of 1849–50; the two former figuring conspicuously in the debates which preluded and resulted in what was termed the Compromise of that year—Mr. Calhoun dying as they had fairly opened, and Messers. Clay and Webster not long after their close. These lines are, therefore, in some sort, my humble tribute to their genius and their just renown.

I best knew and loved Henry Clay; he was by nature genial, cordial, courteous, gracious, magnetic, winning. When General Glascock, of Georgia, took his seat in Congress as a Representative, a mutual friend asked, "General, may I introduce you to Henry Clay?" "No, sir!" was the stern response; "I am his adversary, and choose not to subject myself to his fascination." I think it would have been hard to constitute for three or four years a legislative body whereof Mr. Clay was a member, and not more than four-sevenths were his pledged, implacable opponents, whereof he would not have been the master-spirit, and the author and inspirer of most of its measures, after the first or second year.

Mr. Webster was colder, graver, sterner, in his general bearing: though he could unbend and be sunny and blithe in his intercourse with those admitted to his intimacy. There were few gayer or more valued associates on a fishing or sailing party. His mental calibre was much the larger; I judge that he had read and studied more; though neither could boast much erudition, not even intense application. I believe each was about thirty years in Congress, where Mr. Clay identified his name with the origin or success of at least half a dozen important measures to every one thus blende with Mr. Webster's. Though Webster's was fa the more massive intellect, Mr. Clay as a legislator evinced far the greater creative, constructiv power.

I once sat in the Senate Chamber when Mr Douglas, who had just been transferred from th House, rose to move forward a bill in which h was interested. "We have no such practice in the Senate, sir," said Mr. Webster, in his deep, solemn voice, fixing his eye on the mover, but without rising from his seat. Mr. Douglas at once varied his motion, seeking to achieve his end in a somewhat different way. "That is not the way we do business in the Senate, sir," rejoined Mr Webster, still more decisively and sternly. "The Little Giant" was a bold, ready man, not easily over-awed or disconcerted; but, if he did no quiver under the eye and voice of Webster, ther my eyesight deceived me—and I was very nea him.

Mr. Calhoun was a tall, spare, earnest, evidently thoughtful man, with stiff, iron-gray hair, which reminded you of Jackson's about the time of his accession to the Presidency. He was eminently a logician—terse, vigorous, relentless. He courted the society of clever, aspiring young men who inclined to fall into his views, and exerted great influence over them. As he had abandoned the political faith which I distinguish and cherish as National while I was yet a school-boy, I never met him at all intimately; yet once, while I was connected with mining on Lake Superior, I called on him, as on other leading members of Congress, to explain the effect of the absurd policy then in vogue of keeping mineral lands out of market, and attempting to collect a per centage of the mineral as rent accruing to the Government.

He received me courteously, and I took care to make my statement as compact and perspicuous as I could, showing him that, even in the lead region, where the system had attained its full development, he Treasury did not receive enough rent to pay he salaries of the officers employed in collecting t.

“Enough,” said Mr. Calhoun; “you are clearly ight. I will vote to give away these lands, rather han perpetuate this vicious system.” “We only sk, Mr. Calhoun,” I rejoined, “that Congress fix on the lands whatever price it may deem just, and ell them at that price to those lawfully in possesion; they failing to purchase, then to whomsoever will buy them.” “That plan will have my hearty upport,” he responded; and it did. When the question came at length to be taken, I believe there was no vote in either House against selling the mineral lands.

Horace Greeley.

NAPOLEON.

’TIS done—but yesterday a king!
And armed with kings to strive—
And now thou art a nameless thing;
So abject—yet alive!
Is this the man of thousand thrones,
Who strewed our earth with hostile bones,
And can he thus survive?
Since he, miscalled the Morning Star,
Nor man nor fiend hath fallen so far.

Ill-minded man! why scourge thy kind
Who bowed so low the knee?
By gazing on thyself grown blind,
Thou taught'st the rest to see.
With might unquestioned—power to save—
Thine only gift hath been the grave
To those that worshipped thee;
Nor till thy fall could mortals guess
Ambition's less than littleness!

Thanks for that lesson—it will teach
To after warriors more
Than high philosophy can preach,
And vainly preached before.
That spell upon the minds of men
Breaks never to unite again,
That led them to adore
Those Pagod things of sabre sway,
With fronts of brass and feet of clay.

The triumph and the vanity,
The rapture of the strife;
The earthquake voice of victory,
To thee the breath of life;
The sword, the sceptre, and that sway
Which man seemed made but to obey,
Wherewith renown was rife—
All quelled!—Dark spirit! what must be
The madness of thy memory!

The desolator desolate!
The victor overthrown!
The arbiter of others' fate
A suppliant for his own!
Is it some yet imperial hope,
That with such change can calmly cope?
Or dread of death alone?
To die a prince, or live a slave—
Thy choice is most ignobly brave!

He who of old would rend the oak
Dreamed not of the rebound;
Chained by the trunk he vainly broke—
Alone—how looked he round?
Thou, in the sternness of thy strength,
An equal deed hast done at length,
And darker fate hast found:
He fell, the forest-prowlers' prey;
But thou must eat thy heart away!

Thine evil deeds are writ in gore,
Nor written thus in vain;
Thy triumphs tell of fame no more,
Or deepen every stain.
If thou hadst died as honor dies,
Some new Napoleon might arise,
To shame the world again;
But who would soar the solar height,
To set in such a starless night?

Weighed in the balance, hero dust
Is vile as vulgar clay;
Thy scales, mortality! are just
To all that pass away:
But yet methought the living great
Some higher spark should animate,
To dazzle and dismay;
Nor deemed contempt could thus make mirth
Of these, the conquerors of the earth.

Lord Byron.

ABRAHAM LINCOLN.

FROM THE “COMMEMORATION ODE.”

LIFE may be given in many ways,
And loyalty to truth be sealed
As bravely in the closet as the field,
So bountiful is fate;
But then to stand beside her,
When craven churls deride her,
To front a lie in arms and not to yield,
This shows, methinks, God's plan
And measure of a stalwart man,
Limbed like the old heroic breeds,
Who stand self-poised on manhood's solid earth,
Not forced to frame excuses for his birth,
Fed from within with all the strength he needs.

Such was he, our martyr-chief,
Whom late the nation he had led,
With ashes on her head,
Wept with the passion of an angry grief:
Forgive me, if from present things I turn
To speak what in my heart will beat and burn,
And hang my wreath on his world-honored urn,
Nature they say, doth dote,
And cannot make a man
Save on some worn-out plan,
Repeating us by rote:
For him her Old World moulds aside she threw,
And, choosing sweet clay from the breast
Of the unexhausted west,
With stuff untainted shaped a hero new,
Wise, steadfast in the strength of God, and true.

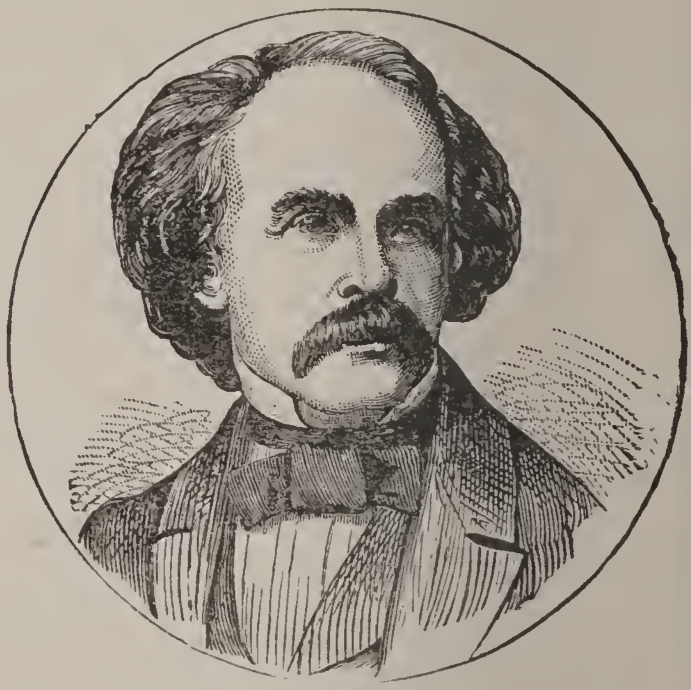
How beautiful to see
Once more a shepherd of mankind indeed,
Who loved his charge, but never loved to lead;
One whose meek flock the people joyed to be,
Not lured by any cheat of birth,
But by his clear-grained human worth,
And brave old wisdom of sincerity!
They knew that outward grace is dust;
They could not choose but trust
In that sure-footed mind's unfaltering skill,
And supple-tempered will
That bent like perfect steel to spring again and thrust.

His was no lonely mountain-peak of mind,
Thrusting to thin air o'er our cloudy bars,
A sea-mark now, now lost in vapors blind;
Broad prairie rather, genial, level-lined,
Fruitful and friendly for all human kind,
Yet also nigh to heaven and loved of loftiest stars.
Nothing of Europe here,
Or, then, of Europe fronting mornward still,
Ere any names of Serf and Peer
Could Nature's equal scheme deface;
Here was a type of the true elder race,
And one of Plutarch's men talked with us face to face.

I praise him not; it were too late;
And some innative weakness there must be
In him who condescends to victory
Such as the Present gives, and cannot wait,
Safe in himself as in a fate.
So always firmly he:
He knew to bide his time,
And can his fame abide,
Still patient in his simple faith sublime,
Till the wise years decide.
Great captains, with their guns and drums,
Disturb our judgment for the hour,
But at last silence comes;
These all are gone, and, standing like a tower,
Our children shall behold his fame,
The kindly-earnest, brave, foreseeing ma
Sagacious, patient, dreading praise, not blame
New birth of our new soil, the first Americ
J. R. LOWEL

NATHANIEL HAWTHORNE.

IN his style he early developed that mat of dignified composure, free from constr or affectation, and that lucid expres which are among its most characteristic tr With little faculty for the harmonies of v he had a singular command over the mu qualities of prose, enabling him to pro periods remarkable for their sonorous riche and delicate cadences, that sometimes ra them almost to the plane of poetry, yet n



HAWTHORNE.

destroy their character as prose by interjec the actual rhythms of verse. Although ex tionally fitted for conveying subtleties of fa and thought, his style is equally adapted to comprehension of children, being invariably and strongly marked by common sense.

Another noticeable peculiarity is that in entire range of his writings quotation is al never resorted to, the author's mind appare feeling no need of aid or illustration from writers. The superlative merits of Hawthor style were but slowly recognized in his country, but his fame has rapidly and stea increased since his death, and he is now g rally esteemed as one of the greatest imagin minds of the century, holding a place in first rank among masters of modern En prose.

The personal appearance of Hawthorne tall, vigorous and commanding. Powerful p cally, and in every way a strong specime manhood, he yet, in his manner and prese showed the gentleness of a woman. His intin vere few, but with them, he was a genial comade, as he was also a delightful companion in is household. The union in him of strength nd sensitiveness has been well described by ames Russell Lowell:

> First, he from sympathy still held apart
> By shrinking, over-eagerness of heart—
> New England's poet, soul-reserved and deep,
> November nature with a name of May.
>
> G. P. Lathrop.

LORD BYRON.

WITH nature's self
He seemed an old acquaintance, free to jest
t will with all her glorious majesty.
Ie laid his hand upon "the Ocean's mane,"
nd played familiar with his hoary locks;
tood on the Alps, stood on the Apennines,
nd with the thunder talked as friend to friend;
nd wove his garland of the lightning's wing,
n sportive twist—the lightning's fiery wing,
Vhich, as the footsteps of the dreadful God,
Iarching upon the storm in vengeance seemed;
hen turned, and with the grasshopper, who sung
Iis evening song beneath his feet, conversed.
uns, moons, and stars, and clouds his sisters were;
ocks, mountains, meteors, seas, and winds, and storms
Iis brothers, younger brothers, whom he scarce
s equals deemed. All passions of all men,
he wild and tame, the gentle and severe;
ll thoughts, all maxims, sacred and profane;
ll creeds, all seasons, time, eternity;
ll that was hated, and all that was dear;
ll that was hoped, all that was feared, by man,—
Ie tossed about, as tempest-withered leaves;
hen, smiling, looked upon the wreck he made.

With terror now he froze the cowering blood,
nd now dissolved the heart in tenderness;
et would not tremble, would not weep himself;
ut back into his soul retired, alone,
ark, sullen, proud, gazing contemptuously
n hearts and passions prostrate at his feet.
o ocean, from the plains his waves had late
o desolation swept, retired in pride,
xulting in the glory of his might,
nd seemed to mock the ruin he had wrought.

As some fierce comet of tremendous size,
o which the stars did reverence as it passed,
o he, through learning and through fancy, took
Iis flights sublime, and on the loftiest top
f fame's dread mountain sat; not soiled and worn,
s if he from the earth had labored up,
ut as some bird of heavenly plumage fair
Ie looked, which down from higher regions came,
nd perched it there, to see what lay beneath.

The nations gazed, and wondered much and praised.
Critics before him fell in humble plight;
Confounded fell; and made debasing signs
To catch his eye; and stretched and swelled themselves
To bursting nigh, to utter bulky words
Of admiration vast; and many too,
Many that aimed to imitate his flight,
With weaker wing, unearthly fluttering made,
And gave abundant sport to after days.

Great man! the nations gazed and wondered much,
And praised; and many called his evil good.
Wits wrote in favor of his wickedness;
And kings to do him honor took delight.
Thus full of titles, flattery, honor, fame;
Beyond desire, beyond ambition, full—
He died—he died of what? Of wretchedness;
Drank every cup of joy, heard every trump
Of fame; drank early, deeply drank; drank draughts
That common millions might have quenched, then died
Of thirst, because there was no more to drink.
His goddess, nature, wooed, embraced, enjoyed,
Fell from his arms, abhorred; his passions died,
Died, all but dreary, solitary pride;
And all his sympathies in being died.

As some ill-guided bark, well built and tall,
Which angry tides cast out on desert shore,
And then, retiring, left it there to rot
And moulder in the winds and rains of heaven;
So he, cut from the sympathies of life,
And cast ashore from pleasure's boisterous surge,
A wandering, weary, worn, and wretched thing,
Scorched and desolate and blasted soul,
A gloomy wilderness of dying thought—
Repined, and groaned, and withered from the earth.
His groanings filled the land his numbers filled;
And yet he seemed ashamed to groan.—Poor man!
Ashamed to ask, and yet he needed help.

Robert Pollok.

ALFRED TENNYSON.

LORD ALFRED TENNYSON has been called the Shakespeare of his time. It is somewhat invidious to compare him with any poet who ever lived. He is a mountain summit by himself, standing alone, majestic and grand, yet anything but cold and forbidding. He is superior in intellectual grasp, original expression, and subtle emotion.

Mr. Tennyson was an artist before he was a poet. I suppose it is in some respects this lavish native strength which has given him his delight in great variety and richness of materials, showing a tropical luxuriance of natural gifts. What his poetical faculty delights in most are rich landscapes, in which either nature or man has accumulated a lavish variety of effects. It is in the scenery of the mill, the garden, the chase, the rich pastures, the harvest fields, the palace pleasure-grounds, fair parks and domains, glowing with sylvan beauty, that Mr. Tennyson most delights.

ALFRED TENNYSON.

He has a strong fascination for old legends, as well as for those common tales of achievement and adventure which delight the popular heart. There is always the movement of real life in his poems, a kind of stately tread and marching forward, which seizes the reader as the mighty tide lays hold of the floating skiff and carries it away on its heaving bosom. His pen-pictures, it may be said, succeed each other too rapidly, yet for the most part his style ripples along with perfect ease and grace.

Not exactly cypress, but a wreath of weeping willow, should encircle his name. He is enamored with ideal beauty and purity of soul, and he sings the praises of holy and exalted friend more than the warmer passion of love. He be characterized as an elevated philosopher wi poet's expression, which a delicate perceptio the beautiful and true has given him.

His harp is not strung with strings whose w loud notes shall first awaken, and then petrify snoring world, but with silken, silvery, gossa chords, whose fairy melody is heard only the delicate spiritual ear.

Yet keeps he perhaps too close to the sh of time, and dares not, or will not, sail mighty oceans of mind, and bring us, like gol fruit, from beyond their distant shores subl and inspiring ideas of futurity. He keeps wings too closely furled, when we consider poetical powers.

R. H. Hutto

CAMP-BELL.

CHARADE.

COME from my first, ay, come!
The battle dawn is nigh;
And the screaming trump and the th
dering drum
Are calling thee to die!

Fight as thy father fought;
Fall as thy father fell;
Thy task is taught; thy shroud is wrought
So forward and farewell!

Toll ye my second! toll!
Fling high the flambeau's light,
And sing the hymn for a parted soul
Beneath the silent night!

The wreath upon his head,
The cross upon his breast;
Let the prayer be said and the tear be shed
So—take him to his rest!

Call ye my whole—ay, call
The lord of lute and lay;
And let him greet the sable pall
With noble song to-day.

Go, call him by his name!
No fitter hand may crave
To light the flame of a soldier's fame
On the turf of a soldier's grave.

W. M. Prae

THE DUKE OF WELLINGTON.

MOURN, for to us he seems the last,
Remembering all his greatness in the p
No more in soldier fashion will he gre
With lifted hand the gazer in the street.
O friends, our chief state-oracle is mute;
Mourn for the man of long-enduring blood,
The statesman-warrior, moderate, resolute,
Whole in himself, a common good.

Alfred Tennyso

CAROLINE AND SIR WILLIAM HERSCHEL.

TWO CELEBRATED ASTRONOMERS.

THE name of Herschel is as bright as the stars in company with which those who bore the name spent a good part of their lives. Their ook seemed to be upward, always exploring the mysteries of the heavens. Brilliant discoveries came within range of their vision, and the great volumes in the library of science are more numerous to-day than as if the Herschels had never lived. They held companionship with the starry heavens, and were on the best of terms with distant worlds.

Caroline was the sister of Sir William Herschel, whom she assisted in his astronomical observations and computations. There have been several women who have excelled in the science of astronomy. It is a science which appeals to their love of the beautiful and the sublime, while at the same time many are gifted with mathematical talent equal to the study. In 1798 Caroline published a valuable catalogue of over 500 stars. Her brother William distinguished himself by many important discoveries, which created a profound impression upon the scientific thought of hi time. He was the first to behold the plane Uranus floating in the far depths of space. Thi was one of the most important discoveries of modern times, and gav to Herschel a name henceforth to b held in honor.

PRISCILLA.

MILES STANDISH, the famou captain of Plymouth Colony feeling the desolation of hi bachelorhood, resolved to take unt himself a wife, and also resolved tha this wife should be the fair Puritan mai Priscilla. Standish sent his dutiful secretary, John Alden, to make known hi wishes and to do the courting. Standish himself felt that he was more skillfu in the arts of war than in those of courtship. Maidens are known sometime to have minds of their own, and Priscilla, not being lost in admiration o Miles Standish, and knowing a goo chance when she saw it, executed flank movement, and said, "Why don' you speak for yourself, John?"

John was not slow to speak afte receiving such encouragement, an Captain Miles Standish was compelle to doff his plumes to the man who ha been commissioned to do the courting It was not long before there were wedding festivities, the termination o which is beautifully described by Longfellow:

Onward the bridal procession now
moved to their new habitation,
Happy husband and wife, and friend
conversing together.
Pleasantly murmured the brook as the
crossed the ford in the forest,
Pleased with the image that passed, lik
a dream of love through its bosom
Tremulous, floating in air, o'er th
depths of the azure abysses.

Down through the golden leaves the su
was pouring his splendors,
Gleaming on purple grapes, that, from
branches above them suspended,
Mingled their odorous breath with th
balm of the pine and the fir-tree,
Wild and sweet as the clusters that grew in th
valley of Eschol.
Like a picture it seemed of the primitive, pastora
ages,
Fresh with the youth of the world and recallin
Rebecca and Isaac,

ld and yet ever new, and simple and beautiful always,
ove immortal and young in the endless succession of lovers.
o through the Plymouth woods passed onward he bridal procession.

ON A BUST OF DANTE.

SEE, from this counterfeit of him
Whom Arno shall remember long,
How stern of lineament, how grim,
The father was of Tuscan song!
There but the burning sense of wrong,
Perpetual care, and scorn, abide—
Small friendship for the lordly throng,
Distrust of all the world beside.

Faithful if this wan image be,
No dream his life was, but a fight;
Could any Beatrice see
A lover in that anchorite?
To that cold Ghibelline's gloomy sight
Who could have guessed the visions came
Of beauty veiled with heavenly light,
In circles of eternal flame?

The lips as Cumæ's cavern close,
The cheeks with fast and sorrow thin,
The rigid front, almost morose,
But for the patient hope within,
Declare a life whose course hath been
Unsullied still, though still severe,
Which, through the wavering days of sin,
Kept itself icy-chaste and clear.

Not wholly such his haggard look
When wandering once, forlorn, he strayed,
With no companion save his book,
To Corvo's hushed monastic shade;
Where, as the Benedictine laid
His palm upon the pilgrim guest,
The single boon for which he prayed
The convent's charity was rest.

Peace dwells not here—this rugged face
Betrays no spirit of repose;
The sullen warrior sole we trace,
The marble man of many woes.
Such was his mien when first arose
The thought of that strange tale divine—
When hell he peopled with his foes,
The scourge of many a guilty line.

War to the last he waged with all
The tyrant canker-worms of earth;
Baron and duke, in hold and hall,
Cursed the dark hour that gave him birth;
He used Rome's harlot for his mirth;
Plucked bare hypocrisy and crime;
But valiant souls of kingly worth
Transmitted to the rolls of time.

O Time! whose verdicts mock our own,
The only righteous judge art thou;
That poor, old exile, sad and lone,
Is Latium's other Virgil now.
Before his name the nations bow;
His words are parcel of mankind,
Deep in whose hearts, as on his brow,
The marks have sunk of Dante's mind.

THOMAS WILLIAM PARSONS.

LADY HENRY SOMERSET.

OF noble birth, yet nobler in heart and soul, Lady Somerset is one of the famous women of our time, by virtue of her broad charity, her arduous labors in the cause of reform, especially that of temperance, and that spirit of self-sacrifice which has devoted fortune and noble birth to the uplifting of the poor and degraded. Her name is known in both hemispheres. In America she has shed the light and glow of her great heart and nature from ocean to ocean. Of rare personal attractions, cultured manners, graceful and forcible speech, untiring labor and enthusiasm, she illustrates vividly what can be accomplished by woman when inspired by a great aim and moved by a holy purpose.

LADY SOMERSET.

Lady Somerset in no degree loses her dignity and refinement by her public life. There is no appearance of coming down; of stepping from some lofty pedestal; of abandoning a sacred sphere, such as the world has always conceded to woman. She lifts up, adorns, purifies, glorifies what she touches, and like the aroma of flowers is the influence of her life.

Henry Davenport.

THE EXECUTION OF MONTROSE.

EXECUTED 1650.

THE morning dawned full darkly,
The rain came flashing down,
And the jagged streak of the levin-bolt
Lit up the gloomy town.
The thunder crashed across the heaven,
The fatal hour was come;
Yet aye broke in, with muffled beat,
The 'larum of the drum.
There was madness on the earth below
And anger in the sky,
And young and old, and rich and poor,
Came forth to see him die.

Ah God! that ghastly gibbet!
How dismal 't is to see
The great tall spectral skeleton,
The ladder and the tree!
Hark! hark! it is the clash of arms—
The bells begin to toll—
"He is coming! he is coming!
God's mercy on his soul!"
One last long peal of thunder—
The clouds are cleared away,
And the glorious sun once more looks down
Amidst the dazzling day.

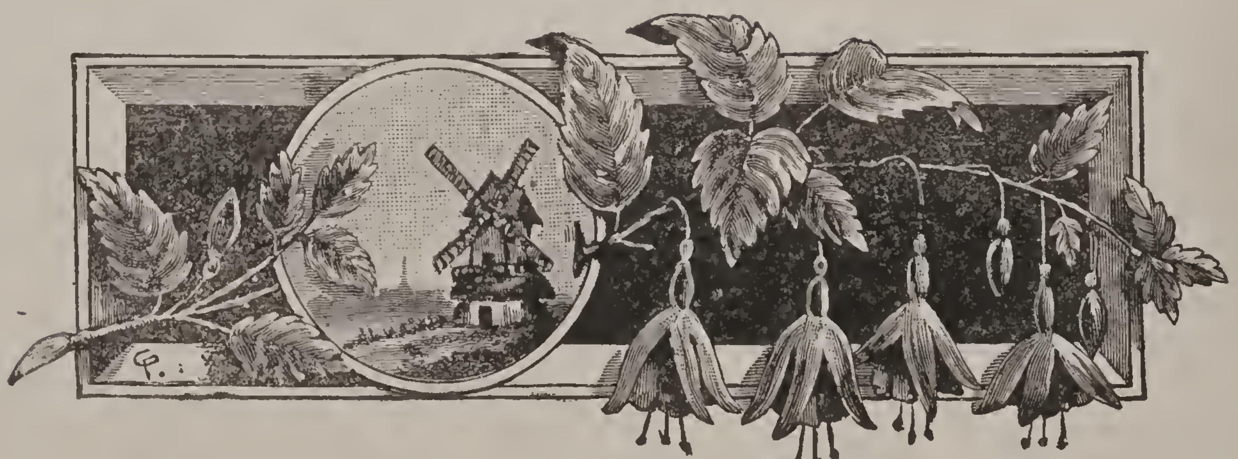
"He is coming! he is coming!"
Like a bridegroom from his room
Came the hero from his prison
To the scaffold and the doom.
There was glory on his forehead,
There was lustre in his eye,
And he never walked to battle
More proudly than to die.
There was color in his visage,
Though the cheeks of all were wan;
And they marvelled as they saw him pass,
That great and goodly man!

He mounted up the scaffold,
And he turned him to the crowd;
But they dared not trust the people,
So he might not speak aloud.
But he looked upon the heavens,
And they were clear and blue,
And in the liquid ether
The eye of God shone through:
Yet a black and murky battlement
Lay resting on the hill,
As though the thunder slept within—
All else was calm and still.

The grim Geneva ministers
With anxious scowl drew near,
As you have seen the ravens flock
Around the dying deer.
He would not deign them word nor sign,
But alone he bent the knee;
And veiled his face for Christ's dear grace
Beneath the gallows-tree.
Then, radiant and serene, he rose,
And cast his cloak away;
For he had ta'en his latest look
Of earth and sun and day.

A beam of light fell o'er him,
Like a glory round the shriven,
And he climbed the lofty ladder
As it were the path to heaven.
Then came a flash from out the cloud,
And a stunning thunder-roll;
And no man dared to look aloft,
For fear was on every soul.
There was another heavy sound,
A hush, and then a groan;
And darkness swept across the sky—
The work of death was done!

W. E. Aytoun.



THOUGHT AND SENTIMENT:

CONTAINING

CHOICE PRODUCTIONS FROM MASTER MINDS.

THE VILLAGE WEAVER.

THE weaver is sitting before his loom,
All day long in a curious room,
Weaving a carpet of various hues;
Here and there is a shade of green,
With brighter colors woven between,
And various tints of browns and blues.

Strangers and neighbors visit the room,
And children, as well, to see the loom,
Who ponder awhile and go away.
Of the visitors that kindly call,
The little ones please him best of all,
With rapturous songs of mirth and play.

Forward and backward the shuttle goes,
Followed by loud and creaking blows,
While the faithful weaver works away.
He turns a selvedge with skillful hands,
Shaping a pattern of various brands,
Out of black and a mixture of gray.

His back is bent and his hair is white,
For many a year has taken flight
Since he on the loom began to weave.
During that time, I may safely say,
The woof that has crossed the warp each day
Could encircle the world, I believe.

I often watch him plying his trade,
Blending with harmony every shade,
And forming a carpet quaint and fine.
On much the same as the weaver planned
Each life is wrought with a filmy strand,
And deeds, like colors, form some design.

Time is a weaver whose shuttles hum,
Until the end of our life has come,
And the soul parts from its dusty loom.
Youth is bright color that fades away,
Age and years are the dark and gray,
And the world is the curious room.

George S. Johnson.

A JEWEL IN DISGUISE.

I'VE met with a good many people
In jogging over life's varied way—
I've encountered the clever, the simple,
The crabbed, the grave and the gay.
I have traveled with beauty, with virtue,
I've been with the ugly, the bad,
I've laughed with the ones who were merry,
And wept with the ones who were sad.

One thing I have learned in my journey,
Never to judge one by what he appears—
The eyes that seem sparkling with laughter
Oft battle to keep back the tears;
And long sanctimonious faces
Hide often the souls that are vile,
While the heart that is merry and cheerful
Is often the freest from guile.

And I've learned not to look for perfection
In one of our frail human kind;
In hearts the most gentle and loving
Some blemish or fault we can find.
But yet I have not found the creature
So low, or depraved, or so mean,
But had some good impulse, some virtue
That 'mong his bad traits might be seen.

A DREAM.

O, IT was but a dream I had
While the musicians played—
And here the sky and here the glad
Old ocean kissed the glade;
And here the laughing ripples ran,
And here the roses grew
That threw a kiss to every man
That voyaged with the crew.

Our silken sails in lazy folds
Dropped in the breathless breeze
As o'er a field of marigolds
Our eyes swam o'er the seas;
While here the eddies lisped and purled
Around the island's rim,
And up from out the underworld
We saw the mermen swim.

And it was dawn and middle day
And midnight—for the moon
On silver rounds across the bay
Had climbed the skies of June—
And here the glowing, glorious king
Of day ruled o'er the realm,
With stars of midnight glittering
About the diadem.

The sea-gull reeled on languid wing
In circles round the mast;
We heard the songs the sirens sing
As we went sailing past,
And up and down the golden sands
A thousand fairy throngs
Flung at us from their flashing hand
The echoes of their songs.

James Whitcomb Riley.

THE DAYS OF THE MODERN BELLE.

OH, for the time of the minuette
When stately movement on movement swayed,
And soft eyes spoke some quaint regret;
Gone are the days of the old brocade;
In the tripping time of the waltz is made
Some deft enchantment, and 'neath its spell
Her dainty heart on his sleeve is laid,
These are the days of the modern belle.

When Hetty was pretty in homespun yet,
And every fold her grace betrayed—
Ah, sombre jewels of coral and jet!
Gone are the days of the old brocade.
From the shops of Paris, we find obeyed
The hints that Virot and Worth may tell,
And gentle simplicity flees dismayed,
These are the days of the modern belle.

'Till now grave memories anxiously fret
At the glittering splendor and gay parade,
And sigh for the times of Polly and Bet—
Gone are the days of the old brocade,
When softest blushes in beauty strayed,
And brimming dimples would come—ah well!
Those gentle years were meant to fade—
These are the days of the modern belle.

Ah, memory listens to fancy's aid,
Gone are the days of the old brocade;
And their very follies our loves impel,
These are the days of the modern belle.

THE FORTUNATE ISLES.

YOU sail and you seek for the Fortunate Isles,
The old Greek Isles of the yellow bird's song?
Then steer straight on through the watery miles,
Straight on, straight on, and you can't go wrong.
Nay, not to the left, nay, not the right,
But on, straight on, and the Isles are in sight,
The Fortunate Isles where the yellow birds sing,
And life lies girt with a golden ring.

These Fortunate Isles they are not so far,
They lie within reach of the lowliest door;
You can see them gleam by the twilight star;
You can hear them sing by the moon's white shore.
Nay, never look back! Those leveled grave-stones,
They were landing-steps; they were steps unto thrones
Of glory for souls that have sailed before,
And have set white feet on the fortunate shore.

And what are the names of the Fortunate Isles?
Why, duty and love and a large content.
Lo! these are the Isles of the watery miles
That God let down from the firmament;
Lo! duty and love, and a true man's trust;
Your forehead to God, and your feet in the dust;
Lo! duty and love, and sweet babe's smiles,
And these, O friend, are the Fortunate Isles.

Joaquin Miller.

IT NEVER COMES AGAIN.

THERE are gains for all our losses,
There are balms for all our pains;
But when youth, the dream, departs,
It takes something from our hearts,
And it never comes again.

We are stronger, and are better,
Under manhood's sterner reign;
Still we feel that something sweet
Followed youth with flying feet,
And will never come again.

Something beautiful is vanished,
And we sigh for it in vain;
We behold it everywhere,
On the earth and in the air;
But it never comes again.

R. H. Stoddard.

THE bird that soars on highest wing,
Builds on the ground its lowly nest,
And she that doth most sweetly sing,
Sings in the shade when all things rest.

J. M. Bentley.

GLORY.

THE crumbling tombstone and the gorgeous mausoleum, the sculptured marble, and the venerable cathedral, all bear witness to the inctive desire within us to be remembered by ing generations. But how short-lived is the ortality which the works of our hands can fer! The noblest monuments of art that the ld has ever seen are covered with the soil of nty centuries. The works of the age of Peri- lie at the foot of the Acropolis in indiscrim- e ruin. The ploughshare turns up the marble ch the hand of Phidias had chiselled into ty, and the Mussulman has folded his flock eath the falling columns of the temple of erva.

ut even the works of our hands too frequently ive the memory of those who have created n. And were it otherwise, could we thus carry n to distant ages the recollection of our exist- , it were surely childish to waste the energies an immortal spirit in the effort to make it wn to other times, that a being whose name written with certain letters of the alphabet, e lived, and flourished, and died. Neither sculptured marble, nor stately column, can reveal to other ages the lineaments of the spirit; and these alone can embalm our memory in the hearts of a grateful posterity. As the stranger stands beneath the dome of St. Paul's, or treads, with religious awe, the silent aisles of Westminster Abbey, the sentiment, which is breathed from every object around him, is, the utter emptiness of sublunary glory.

Francis Wayland.

SOMETIME.

I AM waiting for the shadows round me lying
To drift away;
I am waiting for the sunlight, always flying,
To come and stay;
I know there's light beyond the cloudy curtain,
A light sublime!
That it will shine on me I now am certain,
Sometime! sometime!

I am waiting for the summer's golden lustre—
Now far away—
When golden fruits around my life shall cluster
Each sunny day!

We read of fadeless flowers in fabled story,
In far-off clime,
And I shall pluck them in their pristine glory,
Sometime ! sometime !

Then I shall hear the voice of loved ones call me
To their dear side ;
And I shall then, whatever may befall me,
Rest satisfied !
For on my ear sweet notes of love shall tremble
In matchless rhyme,
From heart and lips that never can dissemble,
Sometime ! sometime !

I am waiting ; but at times I grow so weary—
Far seems the day
When all the pain which makes our life so dreary
Shall pass away.
I know the heart oft filled with tones of sadness,
Like funeral chime,
Shall echo with songs of love and gladness,
Sometime ! sometime !

Hosea Q. Blaisdell.

AN OLD VAGABOND.

HE was old and alone, and he sat on a stone to rest for awhile from the road ;
His beard was white, and his eye was bright, and his wrinkles overflowed
With a mild content at the way life went ; and I closed the book on my knee :
"I will venture a look in this living book," I thought, as he greeted me,

And I said : "My friend, have you time to spend to tell me what makes you glad ?"
"Oh, ay, my lad," with a smile ; "I'm glad that I'm old, yet am never sad !"

"But why ?" said I ; and his merry eye made answer as much as his tongue :
"Because," said he, "I am poor and free who was rich and a slave when young."

John Boyle O'Reilly.

THE PITY OF THE PARK FOUNTAIN.

'TWAS a summery day in the last of May—
Pleasant in sun or shade ;
And the hours went by, as the poets say,
Fragrant and fair on their flowery way ;
And a hearse crept slowly through Broadway—
And the fountain gaily played.

The fountain played right merrily,
And the world looked bright and gay ;
And a youth went by, with a restless eye,
Whose heart was sick and whose brain was dry ;
And he prayed to God that he might die—
And the fountain played away.

Uprose the spray like a diamond throne,
And the drops like music rang—
And of those who marvelled how it shone,
Was a proud man, left, in his shame, alone ;
And he shut his teeth with a smothered groan—
And the fountain sweetly sang.

And a rainbow spanned it changefully,
Like a bright ring broke in twain ;
And the pale, fair girl, who stopped to see,
Was sick with the pangs of poverty—
And from hunger to guilt she chose to flee
As the rainbow smiled again.

And all as gay, on another day,
The morning will have shone ;
And at noon, unmarked, through bright Broadwa
A hearse will take its silent way ;
And the bard who sings will have passed away—
And the fountain will play on !

N. P. Willis.

UNDER THE LEAVES.

INTO the lap of the bare brown earth,
Stripped of her beautiful golden sheav
As if in sympathy for her dearth,
Flutter and nestle the autumn leaves ;
And the lonely landscape hides away
Her face, deep-lined with sad decay,
Under the leaves !

Down from the tall old forest trees
The leafy showers gently fall,
And, taking the wings of the passing breeze,
Softly they cover the earth like a pall.
Ah, would that we the past might fold,
Of blighted hopes and dreams untold,
Under the leaves !

Under the leaves of the flying years
Oh, strive, thou weary soul, to lay
The care and sorrow, the bitter tears,
The dreary burden of yesterday—
Away deep down in the heart's recess,
Under the leaves of forgetfulness,
Under the leaves.

Blanche Buswell.

THE WATER THAT HAS PASSED.

LISTEN to the water-mill,
Through the livelong day,
How the clanking of the wheels
Wears the hours away !
Languidly the autumn wind
Stirs the greenwood leaves ;
From the fields the reapers sing,
Binding up the sheaves,
And a proverb haunts my mind,
As a spell is cast ;
"The mill will never grind
With the water that has passed."

Take the lesson to thyself,
  Loving heart and true;
Golden years are fleeting by,
  Youth is passing too;

Work while yet the daylight shines,
  Man of strength and will;
Never does the streamlet glide
  Useless by the mill.

Learn to make the most of life,
  Lose no happy day;
Time will never bring thee back
  Chances swept away.
Leave no tender word unsaid;
  Love while life shall last—
"The mill will never grind
  With the water that has passed."

Wait not till to-morrow's sun
  Beams upon the way;
All that thou canst call thine own
  Lies in thy to-day.
Power, intellect and health
  May not, can not last;
"The mill will never grind
  With the water that has passed."

Oh, the wasted hours of life
That have drifted by;
Oh, the good we might have done,
Lost without a sigh,
Love that we might once have saved
By a single word;
Thoughts conceived but never penned,
Perishing unheard.
Take the proverb to thine heart,
Take! oh, hold it fast!—
"The mill will never grind
With the water that has passed."

COURAGE.

COURAGE!—Nothing can withstand
Long a wronged, undaunted land;
If the hearts within her be
True unto themselves and thee,
Thou freed giant, liberty!
Oh! no mountain-nymph art thou,
When the helm is on thy brow,
And the sword is in thy hand,
Fighting for thy own good land!

Courage!—Nothing e'er withstood
Freemen fighting for their good;
Armed with all their father's fame.
They will win and wear a name,
That shall go to endless glory,
Like the gods of old Greek story,
Raised to heaven and heavenly worth,
For the good they gave to earth.

Courage!—There is none so poor,
(None of all who wrong endure,)
None so humble, none so weak,
But may flush his father's cheek;
And his maiden's dear and true,
With the deeds that he may do.
Be his days as dark as night,
He may make himself a light.
What though sunken be the sun!
There are stars when day is done!

Courage!—Who will be a slave,
That have strength to dig a grave,
And therein his fetters hide,
And lay a tyrant by his side?
Courage!—Hope, howe'er he fly
For a time, can never die!
Courage, therefore, brother men!
Cry "God! and to the fight again!"

BARRY CORNWALL.

THE FIRESIDE.

DEAR Chloe, while the busy crowd,
The vain, the wealthy, and the proud,
In folly's maze advance;
Though singularity and pride
Be called our choice, we'll step aside,
Nor join the giddy dance

From the gay world we'll oft retire
To our own family and fire,
Where love our hours employs;
No noisy neighbor enters here,
No intermeddling stranger near,
To spoil our heartfelt joys.

If solid happiness we prize,
Within our breast this jewel lies,
And they are fools who roam;
The world hath nothing to bestow—
From our own selves our bliss must flow
And that dear hut, our home.

Our portion is not large, indeed;
But then how little do we need,
For nature's calls are few;
In this the art of living lies,
To want no more than may suffice,
And make that little do.

We'll therefore relish with content
Whate'er kind Providence has sent,
Nor aim beyond our power;
For, if our stock be very small,
'Tis prudence to enjoy it all,
Nor lose the present hour.

To be resigned when ills betide,
Patient when favors are denied,
And pleased with favors given—
Dear Chloe, this is wisdom's part,
This is that incense of the heart,
Whose fragrance smells to heaven.

NATHANIEL COTTON.

ROVING NED.

DIVORCED, did they say? What I, Rovi
Ned,
Divorced in disgrace from the woman I w
In the wealth of her beauty, five summers to-nigh
'Mid the chiming of bells and happiness bright
O God, can it be? Have I fallen so low?
Divorced from that bride—and I loved her so?

Was that Eden a dream? Was that husband
first kiss
But an apple of Sodom in the feast of my bliss?
Were those vows that I spoke but the words
untruth—
A perjurer's lie to the love of his youth?
Were those visions I saw but a mirage of fate
And the words of endearment the seeds of a hate

Was that life in the cottage a dream of the past
And the joy that it brought us too precious
last?
Did the child that was sent us return in its flight
To escape the dark shadows now clouding th
night?
Were our hopes, then so bright, to be shrouded
gloom,
And the roses so sweet but the bloom of the tomb

Bound helpless in sin! Ah, I see it now, plain,
And thou, damning glass, hath enwoven the chain!
O, sparkle and gleam, but I know thee too well;
Thy diamonds of joy are the jewels of hell.
The wealth of thy pleasure is sorrow and care
And the spell of thy charm but the gall of despair.

Ah, sparkle and glimmer, I see in thy tide
The hand that was raised to a once-worshiped bride.
Ah, sparkle and glitter! I see a dread flight
From a drunkard enraged through a cold winter's night.
That husband so proud but a wreck is now left,
Of love and affection and manhood bereft.
I see a lone wanderer over the earth,
Now shunned and disowned by the kin of his birth,
So weary of life, but too sinful to die,
With the pangs of remorse 'neath the frowns from on high.
Far downward he sinks till his oaths sound the knell
Of a soul that is tottering on the verge of a hell.

Cursed be thee, glass! Is thy conquest complete?
No! I will grind thee, fiend, yet 'neath my feet!
By a mother's last prayer, by the home of my birth,

I will dash thee in fragments down swift to the earth !
By the love of that woman that once my name bore
I will rise from a slave to my manhood once more.

Come, friends of my youth, there's a soul to be saved.
Give me of thy strength, there are storms to be braved.
Come back, O my will, with all of thy might
And make me a giant to battle for right.
To earth and to heaven again I will call
And snatch even life from the folds of a pall.

God help me to stand by the vows that I make ;
God help me, if any, in weakness I break ;
Lead me not to the tempter, but guide me in right
Until I am strong in thy mercy and might.
Then lead back my bride to her husband again
And link with thy blessing the now parted chain.

SHERMAN D. RICHARDSON.

SYMPATHY.

SYMPATHY has never a harder task that when it finds itself in the presence of suffering which it is powerless to alleviate, and it never is of greater value or greater helpfulness than just there and then. It is comparatively a light task to bend in sympathy over the suffering, when one's every touch takes away some of the pain, and the hopeful eyes of the patient follow with gratitude every motion of him that ministers.

But when the wound is beyond human skill, and all that one can do, is to stand by in silent or in softly spoken sympathy, and see a loved one racked with pain which none can remove, then comes the truest test of the worth of sympathy. The kindly offices of sympathy are then most precious, simply because they cost so largely, and can effect so little. But there are deeper needs in the human soul than the alleviations of either bodily pain or mental anguish ; and it is these needs which are met by the presence of that sympathy which is so powerless for things merely material. Though the pain may be no whit the less, a new strength comes to the sufferer when he knows that a fellow-heart is suffering with him, and is sending up aspirations, though seemingly in vain, for his quick deliverance.

The wounded beast may have no other need than to crawl away into some dark spot and moan its life out in loneliness ; but from cradle to grave no man lives to himself alone, and none has a right to refuse, when need comes, to fulfill the kindly duty of comforting his brother. Alleviate bodily and mental pain when you can ; but when the call of duty comes for your sympathy in a case where you can do neither, know that your ready answer to that call will do more for the sufferer than the outward eye will see ; for by your pre ence you will share the burden which you cann lift, and your strength will strengthen the wea ness which you cannot remove.

VICTORIA'S TEARS.

"O MAIDEN, heir of kings,
A king has left his place ;
The majesty of death has swept
All others from his face.
And thou, upon thy mother's breast,
No longer lean adown—
But take the glory for the rest,
And rule the land that loves thee best."
The maiden wept ;
She wept to wear a crown !

They decked her courtly halls—
They reined her hundred steeds—
They shouted at her palace gate,
"A noble queen succeeds !"
Her name has stirred the mountains' sleep,
Her praise has filled the town :
And mourners God had stricken deep
Looked hearkening up, and did not weep !
Alone she wept,
Who wept to wear a crown.

She saw no purple shine,
For tears had dimmed her eyes :
She only knew her childhood's flowers
Were happier pageantries !
And while the heralds played their part
For million shouts to drown—
"God save the Queen," from hill to mart—
She heard, through all her beating heart,
And turned and wept !
She wept, to wear a crown.

God save thee, weeping queen !
Thou shalt be well beloved,
The tyrant's sceptre cannot move
As those pure tears have moved ;
The nature in thine eye we see,
Which tyrants cannot own—
The love that guardeth liberties ;
Strange blessing on the nation lies,
Whose sovereign wept,
Yea, wept, to wear its crown.

God bless thee, weeping queen,
With blessing more divine ;
And fill with better love than earth's,
That tender heart of thine ;
That when the thrones of earth shall be
As low as graves brought down,
A piercéd hand may give to thee,
The crown which angels wept to see.
Thou wilt not weep
To wear that heavenly crown.

ELIZABETH B. BROWNING.

DUST FROM THE ROAD OF LIFE.

SOME of the dust from the road of life
Has fallen upon my hair,
And silver threads from my raven locks
Are gleaming out here and there;
And, oh, these meshes of silver gray
Tell of the moments flown—

f the day that's drawing to a close,
And the night that's coming on.

ut the coming night seems cold and dark
And my heart is filled with fears,
As thought flies backward on weary wings,
O'er the waste of vanished years;
And in the castle of memory
Few jewels are treasured there;
But dross and rubbish that tell of earth
Are visible everywhere.

Even on the faithful register,
That hangs in memory's hall,
I find only worthless deeds are traced—
They are dark and blotted all;
Hence, as approaches the eve of life,
My spirit shrinks back with fear,
For threatening clouds o'erspread the sky,
And the night seems very near.

By faith I turn—in the rosy East
A beautiful star I see
Stand o'er the manger in Bethlehem,
And it seems to shine for me;
And from the city of golden spires,
Whose gates just now are ajar,
I catch a radiant beam of light
From the bright and morning star.

And when upon Jordan's restless wave
I shall launch my way-worn bark,
The "dust from the road of life" shall fall
From my tresses long and dark;
And the lines of care upon my brow,
And the pain within my breast,
Shall pass away as my bark draws near
This beautiful land of rest.

MRS. LOUIS BEDFORD.

THE CROWN OF LIFE.

FOR every leaf the loveliest flower
Which beauty sighs for from her bower;
For every star a drop of dew,
For every sun a sky of blue,
For every heart a heart as true!

For every tear by pity shed,
Upon a fellow-sufferer's head,
Oh! be a crown of glory given;—
Such crowns as saints to gain have striven,
Such crowns as seraphs wear in heaven.

For all who toil at honest fame,
A proud, a pure, a deathless name—
For all who love, who loving bless,
Be life one long, kind, close caress,
Be life all love, all happiness!

J. P. Bailey.

THE CHAPERON.

I TAKE my chaperon to the play—
She thinks she's taking me—
And the gilded youth who owns the box,
A proud young man is he.
But how would his young heart be hurt
If he could only know
That not for his sweet sake I go,
Nor yet to see the trifling show;
But to see my chaperon flirt.

Her eyes beneath her snowy hair
They sparkle young as mine;
There's scarce a wrinkle in her hand
So delicate and fine.
And when my chaperon is seen,
They come from everywhere—
The dear old boys with silvery hair,
With old-time grace and old-time air,
To greet their old-time queen.

They bow as my young Midas here
Will never learn to bow,
(The dancing masters do not teach
That gracious reverence now);
With voices quavering just a bit,
They play their old parts through,
They talk of folks who used to woo,
Of hearts that broke in 'fifty-two—
Now none the worse for it.

And as those aged crickets chirp
I watch my chaperon's face,
And see the dear old features take
A new and tender grace—
And in her happy eyes I see
Her youth awakening bright,
With all its hope, desire, delight—
Ah, me! I wish that I were quite
As young—as young as she!

TRUE NOBILITY.

IT does not consist in a pompous display of wealth, a high-sounding name, a long line of ancestry whom the world delighted to honor; nor, yet, in jeweled crowns, steel-emblazoned armor, or costly apparel of purple and fine linen. Indeed, these adjuncts as frequently indicate the absence of a truly noble heart and mind as otherwise. It too often happens that the form instead of the substance of things is the object desired, and as so many are incapable of distinguishing between appearance and reality, it is a very easy matter to dazzle their eyes with a false display greatness and goodness. Since the world sets much value on a lofty title, it is too frequently case that its possessor makes little effort to m the name he bears. That man is not to be rel upon who makes his name and inheritance stepping-stone to his entrance into good society

It is not an evidence of nobility to do a prai worthy act at the risk of personal safety when y have hopes of a liberal reward. There are ma who will expose their lives to save that of anot when they have reason to believe that the risk volved will be amply remunerated who would ref to do so when they have no such expectations. pay homage to men who have slain thousands the bloody field of war and won many battles the sake of victory. We call them great; ye rough sailor who plunges into the sea to save drowning child for humanity's sake alone, ha far nobler heart beating within his sunburnt bos than the victor of a thousand battles. Were I called upon to name four words as synonym with the word nobility, I would say truth, hones bravery, charity.

BIRDS OF PASSAGE.

BLACK shadows fall
From the lindens tall,
That lift aloft their massive wall
Against the southern sky;

And from the realms
Of the shadowy elms
A tide-like darkness overwhelms
The fields that round us lie.

But the night is fair,
And everywhere
A warm, soft vapor fills the air,
And distant sounds seem near;

And above, in the light
Of the star-lit night,
Swift birds of passage wing their flight
Through the dewy atmosphere.

I hear the beat
Of their pinions fleet,
As from the land of snow and sleet
They seek a southern lea.

I hear the cry
Of their voices high
Falling dreamily through the sky,
But their forms I cannot see.

O, say not so!
Those sounds that flow
In murmurs of delight and woe
Come not from wings of birds.

They are the throngs
Of the poet's songs,
Murmurs of pleasures, and pains, and wrongs,
The sound of wingéd words.

This is the cry
Of souls, that high
On toiling, beating pinions fly,
Seeking a warmer clime.

From their distant flight
Through realms of light
It falls into our world of night,
With the murmuring sound of rhyme.

H. W. Longfellow.

DIMES AND DOLLARS.

“DIMES and dollars! dollars and dimes!”
Thus the old miser rang the chimes,
As he sat by the side of an open box,
With ironed angles and massive locks;
And he heaped the glittering coin on high,
And cried in delirious ecstasy—
“Dimes and dollars! dollars and dimes!
Ye are the ladders by which man climbs
Over his fellows. Musical chimes!
Dimes and dollars! dollars and dimes!”

A sound on the gong and the miser rose,
And his laden coffer did quickly close,
And locked secure. “These are the times
For a man to look after his dollars and dimes.
A letter! Ha! from my prodigal son.
The old tale—poverty—pshaw, begone!
Why did he marry when I forbade?
Let him rest as he can on the bed he has made,
As he has sown, so he must reap;
But I my dollars secure will keep.
A sickly wife and starving times!
He should have wed with dollars and dimes.”

Thickly the hour of midnight fell;
Doors and windows were bolted well.
“Ha!” cried the miser, “not so bad;—
A thousand guineas to-day I've made.
Money makes money; these are the times
To double and treble the dollars and dimes.
Now to sleep, and to-morrow to plan—
Rest is sweet to a wearied man.”
And he fell to sleep with the midnight chimes,
Dreaming of glittering dollars and dimes.

The sun rose high and its beaming ray
Into the miser's room found way.
It moved from the foot till it lit the head
Of the miser's low, uncurtained bed;
And it seemed to say to him, “Sluggard, awake;
Thou hast a thousand dollars to make.
Up, man, up!” How still was the place,
As the bright ray fell on the miser's face!
Ha! the old miser at last is dead;
Dreaming of gold his spirit fled,
And left behind but an earthly clod,
Akin to the dross that he made his god.

What now avails the chinking chimes
Of dimes and dollars! dollars and dimes?
Men of the times! men of the times!
Content may not rest with dollars and dimes.
Use them well, and their use sublimes
The mineral dross of the dollars and dimes.
Use them ill, and a thousand crimes
Spring from a coffer of dollars and dimes.
Men of the times! men of the times!
Let charity dwell with your dollars and dimes.

Henry Mills.

THE TOWN PUMP.

THE pump, straight as a soldier stands:
Good friend of mine,
I clasp his hand with my two hands,
And shake it hard and heartily.
Although 'tis not his turn to treat,
He stands out in the open street,
And pours his wine
With wasteful hospitality.

With grateful heart I drink my fill,
From his full cup;
And others come, and drink, and still
The crystal current freely flows
For all the thirsty multitude;
The beverage pure that nature brewed
To cheer us up.
Here's to the drink the pump bestows!

Nor rich nor poor the pump will slight.
Gentile and Jew,
Christian, Moslem and Muscovite,
Thy bounteous gift alike may share;
Thine is a noble, generous deed,
That washes out the lines of creed,
And, like the dew,
Falls pure and stainless in the air.

A benefactor pure thou art,
To thirsty souls.
I feel a quicker pulse of heart,
When my hand touches thine, old friend.
Thy shadow marks the narrow way,
Which, followed, will not lead astray
Where tempting bowls
May bring life to a bitter end.

There, like fair Rachel at the well,
A maiden stands,
Will Jacob come and break the spell
Of her mysterious revery?
Oh, dear old pump, the people's friend,
May benedictions without end
Fill the clean hands
That clasp thy hand outreached and free.

George W. Bungay.

FAULTS.

A MAN has a large emerald, but it is "feathered," and he knows an expert would say, "What a pity that it has such a feather!" it will not bring a quarter as much as it otherwise would; and he cannot take any satisfaction in it. A man has a diamond; but there is a flaw in it, and it is not the diamond that he wants. A man has an opal, but it is imperfect, and he is dissatisfied with it. An opal is covered with little seams, but they must be the right kind of seams. If it has a crack running clear across, it is marred, no matter how large it is, and no matter how wonderful its reflections are. And this man is worried all the time because he knows his opal is imperfect; and it would worry him even if he knew that nobody else noticed it.

So it is in respect to dispositions, and in respect to character at large. Little cracks, little flaws, little featherings in them, take away their exquisiteness and beauty, and take away that fine finish which make moral art. How many noble men there are who are diminished, who are almost wasted, in their moral influence! How many men are like the red maple! It is one of the most gorgeous trees, both in spring, blossoming, and in autumn, with its crimson foliage. But it stands knee-deep in swamp-water, usually. To get to it you must wade or leap from bog to bog, tearing your raiment and soiling yourself. I see a great many noble men, but they stand in a swamp of faults. They bear fruit that you fain would pluck, but there are briars and thistles and thorns all about it; and to get it you must make your way through all these hindrances.

How many persons there are that are surrounded by a thousand little petty faults! They are so hedged in by these things that you lose all the comfort and joy you would otherwise have in them.

HENRY WARD BEECHER.

VASTNESS OF THE SEA.

THE sea! the sea! the open sea!
The blue, the fresh, the ever free!
Without a mark, without a bound,
It runneth the earth's wide regions round;
It plays with the clouds, it mocks the skies,
Or like a cradled creature lies.

BARRY CORNWALL.

THE CHIMES OF AMSTERDAM.

FAR up above the city,
In the gray old belfry tower,
The chimes ring out their music
Each day at the twilight hour,

Above the din and the tumult,
And the rush of the busy street,
You can hear their solemn voices
In an anthem clear and sweet.

When the busy day is dying,
And the sunset gates, flung wide,
Mark a path of crimson glory
Upon the restless tide,
As the white-winged ships drop anchor,
And furl their snowy sails,
While the purple twilight gathers,
And the glowing crimson pales;

Then from the old gray belfry
The chimes peal out again,
And a hush succeeds the tumult,
As they ring their sweet refrain;
No sound of discordant clangor
Mars the perfect melody,
But each, attuned by a master hand,
Has its place in the harmony.

I climbed the winding stairway
That led to the belfry tower,
As the sinking sun in the westward
Heralded twilight's hour;
For I thought that surely the music
Would be clearer and sweeter far
Than when through the din of the city
It seemed to float from afar.

But lo, as I neared the belfry,
No sound of music was there,
Only a brazen clangor
Disturbed the quiet air!
The ringer stood at a keyboard,
Far down beneath the chimes,
And patiently struck the noisy keys,
As he had uncounted times.

He had never heard the music,
Though every day it swept
Out over the sea and the city,
And in lingering echoes crept.
He knew not how many sorrows
Were cheered by the evening strain,
And how men paused to listen
As they heard the sweet refrain.

He only knew his duty,
And he did it with patient care;
But he could not hear the music
That flooded the quiet air;
Only the jar and the clamor
Fell harshly on his ear,
And he missed the yellow chiming
That every one else could hear.

So we from our quiet watch-towers
May be sending a sweet refrain,
And gladdening the lives of the lowly
Though we hear not a single strain.

Our work may seem but a discord,
Though we do the best we can;
But others will hear the music,
If we carry out God's plan.

Far above a world of sorrow,
And o'er the eternal sea,
It will blend with angelic anthems
In sweetest harmony;
It will ring in lingering echoes
Through the corridors of the sky,
And the strains of earth's minor music
Will swell the strains on high.

MINNIE E. KENNEY.

ONLY FRIENDS.

SUMMER'S freshness fell around us,
Nature dreamed its sweetest dream,
Every balmy evening found us
By the meadow or the stream,
With our hearts as free from sadness
As the sunshine heaven sends;
Youth's bright garden bloomed in gladness,
Where we wandered—only friends.

Not a word of love was spoken,
No hot blushes flushed in red;
Love's first sleep was left unbroken,
Bitter tears were never shed.
We were young and merry-hearted,
Dreaming not of future ends,
And without a sigh we parted;
Fate had made us—only friends.

But a little germ of sorrow
Wakened in my heart's recess,
When I wandered on the morrow
By our haunts of happiness,
And this germ found deeper rooting
As the weary days wore on,
Till I felt a blossom shooting
In love's garden all alone.

No kind fate threw us together,
We had missed the lucky tide;
Golden-gilded summer weather
Not forever doth abide,
But for me, though vainly sighing
For a love time never sends,
Still is left this thought undying,
We, alas! were—only friends.

THE HELPING HAND.

THE timid hand stretched forth to aid
A brother in his need,
The kindly word in grief's dark hour
That proves the friend indeed,
The plea for mercy softly breathed
When justice threatens nigh,
The sorrows of a contrite heart—
These things shall never die.

LIFE'S WINTER.

'TIS done! dread winter spreads his latest glooms,
And reigns tremendous o'er the conquered year.
How dead the vegetable kingdom lies!
How dumb the tuneful! horror wide extends

His desolate domain! Behold, fond man!
See here thy pictured life: pass some few years,
Thy flowering spring, thy summer's ardent strength,
Thy sober autumn fading into age,
And pale concluding winter comes at last,
And shuts the scene.

JAMES THOMSON.

THE OLD REAPER.

MID the brown-haired and the black-haired men,
With ruddy faces aglow,
The old man stood in the harvest field,
With a head as white as snow.
"Let me cut a sheaf, my boys," he said
"Before it is time to go."

They put the sickle within his hand:
He bowed to the windy wheat;
Pleasantly fell the golden ears,
With the corn flowers at his feet.
He lifted a handful, thoughtfully;
It was ripe and full and sweet.

"Many and many a sheaf," he said,
"I have cut in the years gone past;
And many and many a sheaf these arms
On the harvest wains have cast.
But, children dear, I am weary now,
And I think this is—the last.

"Let me rest awhile beneat the tree;
For I like to watch you go,
With sickles bright, through th ripe, full wheat,
And to feel the fresh win blow."
And they spread their workin coats for him
'Mong the grasses sweet an low.

When the sun grew high the came again,
For a drink and their brea and meat;
And in the shadow he sleepin lay,
With sunshine on his feet.
Like a child at night, outspen with play,
He lay in slumber sweet.

TIME'S FLIGHT.

O'ER the level plains, where mountains gree me as I go,
O'er the desert waste, where fountain at my bidding flow,
On the boundless beam by day, on the cloud b night,
I am riding hence away: who will chain m flight?

War his weary watch was keeping—I have crushe his spear;
Grief within her bower was weeping—I have drie her tear;
Pleasure caught a minute's hold—then I hurrie by,
Leaving all her banquet cold and her goblet dry.

Power had won a throne of glory: where is no his fame?
Genius said: "I live in story," who hath hear his name?
Love beneath a myrtle bough whispered "Why fast?"
And the roses on his brow withered as I past.

have heard the heifer lowing o'er the wild wave's bed;
have seen the billow flowing where the cattle fed;
Where began my wanderings? Memory will not say!
Where will rest my weary wings? Science turns away!

W. M. Praed.

TO A FRIEND,

ON HER RETURN FROM EUROPE.

HOW smiled the land of France
Under thy blue eye's glance,
Light hearted rover!
Old walls of chateaux gray,
Towers of an early day,
Which the three colors play
Flauntingly over.

Now midst the brilliant train
Thronging the banks of Seine:
Now midst the splendor
Of the wild Alpine range,
Waking with change on change
Thoughts in thy young heart strange,
Lovely, and tender.

Vales, soft Elysian,
Like those in the vision
Of Mirza, when, dreaming,
He saw the long hollow dell,
Touched by the prophet's spell,
Into an ocean swell
With its isles teeming.

Cliffs wrapped in snows of years,
Splintering with icy spears
Autumn's blue heaven:
Loose rock and frozen slide,
Hung on the mountain side,
Waiting their hour to glide
Downward, storm-driven!

Rhine stream, by castle old,
Baron's and robber's hold,
Peacefully flowing;
Sweeping through vineyards green,
Or where the cliffs are seen
O'er the broad wave between
Grim shadows throwing.

Or, where St. Peter's dome
Swells o'er eternal Rome,
Vast, dim and solemn—
Hymns ever chanting low—
Censers swung to and fro—
Sable stoles sweeping slow
Cornice and column!

Oh, as from each and all
Will there not voices call
Evermore back again?
In the mind's gallery
Wilt thou not always see
Dim phantoms beckon thee
O'er that old track again?

New forms thy presence haunt—
New voices softly chant—
New faces greet thee!—
Pilgrims from many a shrine
Hallowed by poet's line,
At memory's magic sign,
Rising to meet thee.

And when such visions come
Unto thy olden home,
Will they not waken
Deep thoughts of Him whose hand
Led thee o'er sea and land
Back to the household band
Whence thou wast taken?

While, at the sunset time,
Swells the cathedral's chime,
Yet, in thy dreaming,
While to thy spirit's eye,
Yet the vast mountains lie
Piled in the Switzer's sky,
Icy and gleaming:

Prompter of silent prayer,
Be the wild picture there
In the mind's chamber,
And, through each coming day
Him, who, as staff and stay,
Watched o'er thy wandering way,
Freshly remember.

So, when the call shall be
Soon or late unto thee,
As to all given,
Still may that picture live,
All its fair forms survive,
And to thy spirit give
Gladness in heaven!

J. G. Whittier.

TEN YEARS AGO.

I TOO am changed—I scarce know why—
Can feel each flagging pulse decay;
And youth and health, and visions high,
Melt like a wreath of snow away;
Time cannot sure have wrought thee ill;
Though worn in this world's sickening strife,
In soul and form, I linger still
In the first summer month of life;
Yet journey on my path below,
Oh! how unlike—ten years ago!

But look not thus: I would not give
The wreck of hopes that thou must share,

To bid those joyous hours revive,
When all around me seemed so fair.
We've wandered on in sunny weather,
When winds were low, and flowers in bloom,

IN THE ART GALLERY.

And hand in hand have kept together,
And still will keep, 'mid storm and gloom;
Endeared by ties we could not know
When life was young—ten years ago!

Has fortune frowned? Her frowns were vain,
For hearts like ours she could not chill;
Have friends proved false? Their love might wane,
But ours grew fonder, firmer still.
Twin barks on this world's changing wave,
Steadfast in calms, in tempests tried;
In concert still our fate we'll brave,
Together cleave life's fitful tide;
Nor mourn, whatever winds may blow,
Youth's first wild dreams—ten years ago!

ALARIC A. WATTS

THE ANGEL OF PATIENCE.

FROM THE GERMAN.

TO weary hearts, to mourning homes,
God's meekest angel gently comes:
No power has he to banish pain,
Or give us back our lost again:
And yet in tenderest love, our dear
And Heavenly Father sends him here.

There's quiet in that angel's glance,
There's rest in his still countenance!
He mocks no grief with idle cheer,
Nor wounds with words the mourner's ear;

But ills and woes he may not cure
He kindly trains us to endure.

Angel of Patience! sent to calm
Our feverish brows with cooling palm;
To lay the storms of hope and fear,
And reconcile life's smile and tear;
The throbs of wounded pride to still
And make our own our Father's will!

Oh! thou who mournest on thy way,
With longings for the close of day;
He walks with thee, that angel kind,
And gently whispers "Be resigned:
Bear up, bear on, the end shall tell
The dear Lord ordereth all things well!"

J. G. Whittier.

TWO GRAVES.

A RICH man died. They laid him down to rest
Upon a fair slope, slanting toward the west,
And cast about the silence of his tomb
marble mausoleum's sacred gloom.

hey hung within its tower, tall and white,
chime of sweet-voiced bells; and every night,
ıst as the red sun sank below the swell
f that green hill they tolled his solemn knell.

nother died. They buried him in haste
ithin a barren field, a weedy waste.
ank nettles locked their arms, and thorns were sown
bove his bed, unmarked by cross or stone.

ne lived on many tongues; the other fell
om human memory; and both slept well!

THE BUILDERS.

ALL are architects of fate,
Working in these walls of time;
Some with massive deeds and great,
Some with ornaments of rhyme.

Nothing useless is, or low;
Each thing in its place is best;
And what seems but idle show
Strengthens and supports the rest.

For the structure that we raise,
Time is with materials filled;
Our to-days and yesterdays
Are the blocks with which we build.

Truly shape and fashion these;
Leave no yawning gaps between;
Think not, because no man sees,
Such things will remain unseen.

In the elder days of art,
Builders wrought with greatest care
Each minute and unseen part;
For the gods see everywhere.

Let us do our work as well,
Both the unseen and the seen;
Make the house, where gods may dwell,
Beautiful, entire, and clean.

Else our lives are incomplete,
Standing in these walls of time,
Broken stairways, where the feet
Stumble as they seek to climb.

Build to-day, then, strong and sure,
With a firm and ample base;]
And ascending and secure
Shall to-morrow find its place.

Thus alone can we attain
To those turrets, where the eye
Sees the world as one vast plain,
And one boundless reach of sky.

H. W. Longfellow.

A GOOD NEW YEAR.

A "Good New Year," so let it be,
But, brother, as I take it,
And so I think you will agree,
'Twill be just as you make it.

A "good new year," the wish is good,
None will presume to doubt it;
Still, wishes are but flimsy food,
What will you *do* about it?

If you have vowed to snap and bite
At all men as you meet them,
The year will hardly come out right—
Men don't want churls to greet them.

If you're resolved to curse your stars,
At every little trouble,
And let your spite breed mimic wars,
You'll find your sorrows double.

But should you think that life is short
And strive to make it sunny,
My head for yours, you'll find the sport
Better than all your money.

The years don't grow upon the trees,
To pull as you may choose them;
They come and go just as they please,
'Tis yours to mar or use them.

'Tis well to wish a good new year,
If wishing so would do it;
Kind words, kind deeds, and smiles of cheer,
Will better help you through it.

William Lyle.

WE'LL GO TO SEA NO MORE.

O BLITHELY shines the bonny sun
Upon the Isle of May,
And blithely comes the morning tide
Into St. Andrew's Bay.
Then up, gudeman, the breeze is fair,
And up, my braw bairns, three;
When squalls capsize our wooden walls
When the French ride at the Nore,
When Leith meets Aberdour half way,
We'll go to sea no more—
No more,
We'll go to sea no more.

There's goud in yonder bonny boat
That sails sae weel the sea!
When haddocks leave the Firth o' Forth,
And mussels leave the shore,
When oysters climb up Berwick Law,
We'll go to sea no more—
No more,
We'll go to sea no more.

I've seen the waves as blue as air,
I've seen them green as grass;
But I never feared their heaving yet,
From Grangemouth to the Bass.
I've seen the sea as black as pitch,
I've seen it white as snow;
But I never feared its foaming yet,
Though the winds blew high or low.

I never liked the landsman's life,
The earth is aye the same;
Gie me the ocean for my dower,
My vessel for my hame.
Gie me the fields that no man plows,
The farm that pays no fee;
Gie me the bonny fish that glance
So gladly through the sea.
When sails hang flapping on the masts
While through the waves we snore,
When in a calm we're tempest-tossed,
We'll go to sea no more—
No more,
We'll go to sea no more.

The sun is up, and round Inchkeith
The breezes softly blaw;

The gudeman has the lines on board—
Awa, my bairns, awa!
An' ye be back by gloamin' gray,
An' bright the fire will glow,
An' in your tales and sangs we'll tell
How weel the boat ye row.
When life's last sun gaes feebly down
And death comes to our door,
When a' the world's a dream to us,
We'll go to sea no more—
No more,
We'll go to sea no more.

ADELAIDE CORBETT.

A HAND PRESSURE.

ONLY a pressure of the hand,
Nothing more,
For on the valley side we stand!
The avalanche holds his mighty weight,
Poised for a breath to overthrow.
Speak not a word. 'Tis the hush of fate.
What if the load be tears or snow,
If a life is o'er!

Up on the high, clear mountain peak
Near the sun,
There with a calm heart one may speak.
There where the hawk goes circling round,
Seeking the cleft she builded in,
Far above drifts and ice-rent ground,
At the last height, where the skies begin
Is the burden done.

CURTIS MAY.

LUCK AND LABOR.

'T has been denied that any other credit than that of good luck is due to Fulton for his invention. Gentlemen would have us suppose iat good luck is the parent of all that we admire science or in arms. If this be so, why, then, deed, what a bubble is reputation! How vain nd' how idle are the anxious days and sleepless ights devoted to the service of one's country! dmit this argument and you strip from the brow the scholar his bay, and from those of the states-an and soldier their laurel.

Why do you deck with chaplets the statue of the ather of his Country, if good luck, and good luck one, be all that commends him to our gratitude nd love? A member of this House retorts, "Bad ck would have made Washington a traitor." Ay, ut in whose estimation? Did the great and holy rinciples which produced and governed our Revo-ition depend, for their righteousness and truth, pon success or defeat? Would Washington, had e suffered as a rebel on the scaffold—would Vashington have been regarded as a traitor by Varren and Hancock and Greene and Hamilton —by the crowd of patriots who encompassed him, partners of his toil and sharers of his patriotism? Was it good luck that impelled Columbus, through discouragement, conspiracy and poverty, to persevere in his path of danger, until this western world blessed his sight, and rewarded his energy and daring? Does the gentleman emulate the glory of the third king of Rome, Tullus Hostillus—and would he erect in our own land a temple to fortune? It cannot be that he would seriously promulgate such views;—that he would take from human renown all that gives it dignity and worth, by making it depend less on the virtue of the individual than on his luck!

OGDEN HOFFMAN.

ROCK ME TO SLEEP.

BACKWARD, turn backward, O time, in your flight,
Make me a child again just for to-night!
Mother, come back from the echoless shore,
Take me again to your heart as of yore;
Kiss from my forehead the furrows of care,
Smooth the few silver threads out of my hair;
Over my slumbers your loving watch keep;—
Rock me to sleep, mother—rock me to sleep!

Backward, flow backward, oh, tide of the years!
I am so weary of toil and of tears—
Toil without recompense, tears all in vain—
Take them, and give me my childhood again!
I have grown weary of dust and decay—
Weary of flinging my soul-wealth away;
Weary of sowing for others to reap;—
Rock me to sleep, mother—rock me to sleep!

Tired of the hollow, the base, the untrue,
Mother, O mother, my heart calls for you!
Many a summer the grass has grown green,
Blossomed and faded, our faces between:
Yet, with strong yearning and passionate pain,
Long I to-night for your presence again.
Come from the silence so long and so deep;—
Rock me to sleep, mother—rock me to sleep!

Over my heart, in the days that are flown,
No love like mother-love ever has shone;
No other worship abides and endures—
Faithful, unselfish, and patient like yours:
None like a mother can charm away pain
From the sick soul and the world-weary brain.
Slumber's soft calms o'er my heavy lips creep;—
Rock me to sleep, mother—rock me to sleep!

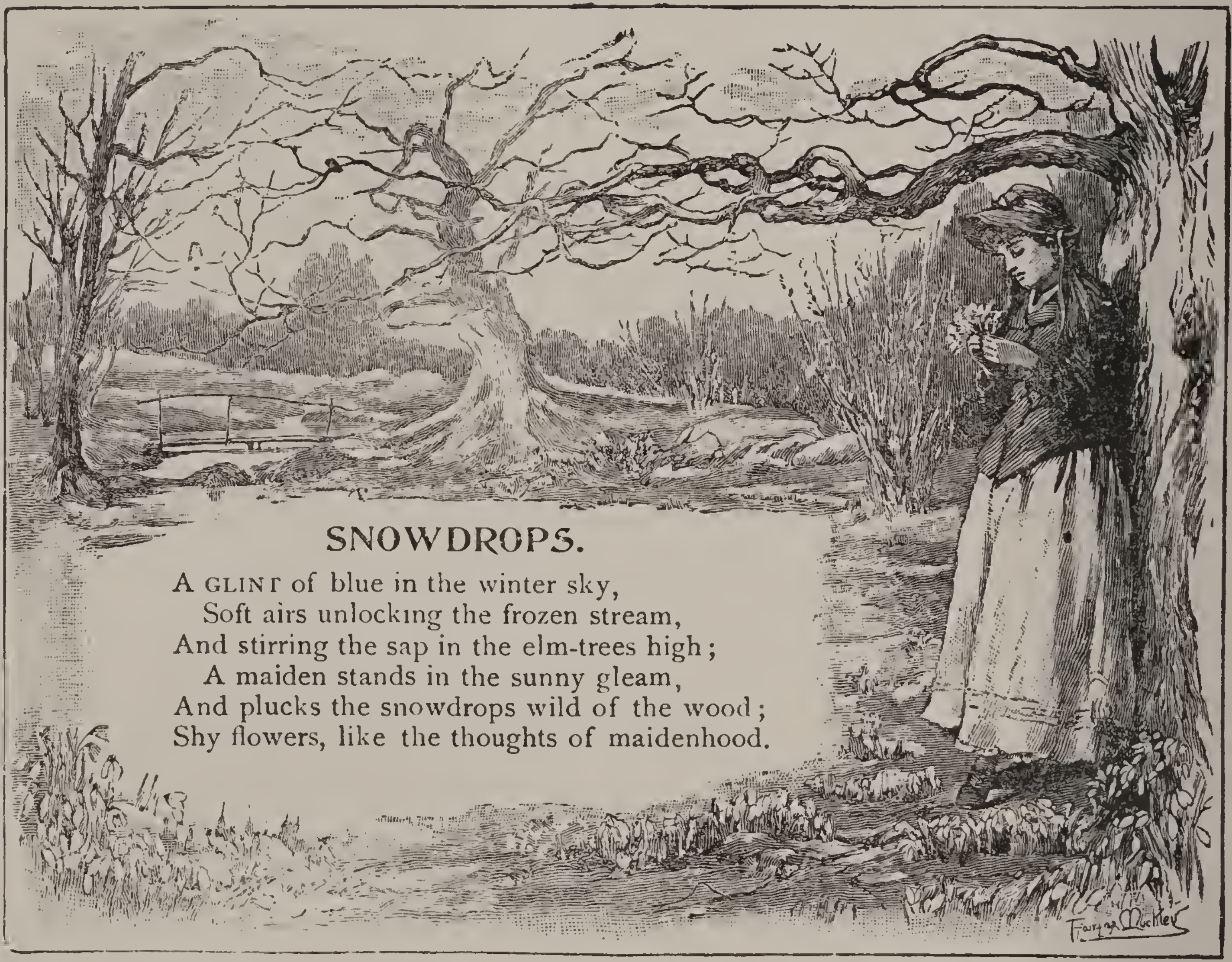
Come, let your brown hair, just lighted with gold,
Fall on your shoulders again as of old;
Let it drop over my forehead to-night,
Shading my faint eyes away from the light;
For with its sunny-edged shadows once more
Haply will throng the sweet visions of yore;
Lovingly, softly, its bright billows sweep:—
Rock me to sleep, mother—rock me to sleep!

Mother, dear mother, the years have been long
Since I last listened your lullaby song:
Sing, then, and unto my soul it shall seem
Womanhood's years have been only a dream.
Clasped to your heart in a loving embrace,
With your light lashes just sweeping my face,
Never hereafter to wake or to weep;—
Rock me to sleep, mother—rock me to sleep!

ELIZABETH A. ALLEN.

How happy he,
The saint to be
Of the girls and all the boys!
He hears his praise
Through the holidays,
As they eat their sweets, and break their to

So still he smiles,
And the time beguiles



SNOWDROPS.

A GLINT of blue in the winter sky,
Soft airs unlocking the frozen stream,
And stirring the sap in the elm-trees high;
A maiden stands in the sunny gleam,
And plucks the snowdrops wild of the wood;
Shy flowers, like the thoughts of maidenhood.

CHRISTMAS EVE.

THE snow is white
On the roofs to-night;
The moon looks down with her silvery smile;
And the wind blows free
Through bush and tree,
And whistles along for mile on mile.

And ah! hark there!
On the midnight air,
Comes the faintest tinkle of fairy bells.
They are coming near,
They are coming here,
And their sweet sound swelling of joy foretells.

It is Santa Claus,
And he cannot pause;
But down the chimney he quickly glides;
Each stocking fills,
Till it almost spills,
Then gayly chuckles, and off he glides.

Concocting schemes our hearts to cheer;
He loves us all,
And great and small
Regret that he comes but once a year.

WILLIAM B. DUNHA

FORGIVE ME NOW.

WAIT not the morrow, but forgive me n
Who knows what fate to-morrow's d
may bring?
Let us not part with shadow on thy brow,
With my heart hungering.

Wait not the morrow, but entwine thy hand
In mine, with sweet forgiveness full and f
Of all life's joys I only understand
This joy of loving thee.

Perhaps some day I may redeem the wrong,
Repair the fault—I know not when or ho
Oh, dearest, do not wait—it may be long—
Only forgive me now.

IN THE CAGE.

DOST thou use me as fond children do
Their birds, show me my freedom in a string,
And, when thou'st played with me a while, then pull
Me back again, to languish in my cage?

SIR W. DAVENANT.

NATIONAL HATRED.

NO, Sir! no, Sir! We are above all this. Let the Highland clansman, half naked, half civilized, half blinded by the peat-smoke of his cavern, have his hereditary enemy and his hereditary enmity, and keep the keen, deep and precious hatred, set on fire of hell, alive, if he can; let the North American Indian have his, and hand it down from father to son, by Heaven knows what symbols of alligators, and rattlesnakes, and war-clubs smeared with vermilion and entwined with scarlet; let such a country as Poland—cloven to the earth, the armed heel on the radiant forehead, her body dead, her soul incapable to die—let her remember the "wrongs of days long past;" let the lost and wandering tribes of Israel remember theirs—the manliness and the sympathy of the world may allow or pardon this to them; but shall America, young, free, prosperous, just setting out on the highway of Heaven, "decorating and cheering the elevated sphere she just begins to move in, glittering like the morning star, full of life and joy," shall she be supposed to be polluting and corroding her noble and happy heart, by moping over old stories of stamp act, and tea tax, and the firing of the "Leopard" upon the "Chesapeake" in a time of peace? No, Sir! no, Sir! a thousand times no!

Why, I protest I thought all that had been settled. I thought two wars had settled it all. What else was so much good blood shed for, on so many more than classical fields of Revolutionary glory? For what was so much good blood more lately shed at Lundy's Lane, at Fort Erie, before and behind the lines at New Orleans, on the deck of the "Constitution," on the deck of the "Java," on the lakes, on the sea, but to settle exactly these "wrongs of past days?" And have we come back sulky and sullen from the very field of honor? For my country I deny it.

Mr. President, let me say that, in my judgment, this notion of a national enmity of feeling towards Great Britain belongs to a past age of our history. My younger countrymen are unconscious of it. They disavow it. That generation in whose opinions and feelings the actions and the destiny of the next are unfolded, as the tree in the germ, do not at all comprehend your meaning, nor your fears, nor your regrets. We are born to happier feelings. We look to England as we look to France. We look to them, from our new world—not unrenowned, yet a new world still—and the blood mounts to our cheeks; our eyes swim; our

voices are stifled with emulousness of so much glory; their trophies will not let us sleep: but there is no hatred at all; no hatred,—no barbarian memory of wrongs, for which brave men have made the last expiation to the brave. RUFUS CHOATE.

ELEGY WRITTEN IN A COUNTRY CHURCHYARD.

THE curfew tolls the knell of parting day,
The lowing herd winds slowly o'er the lea;
The ploughman homeward plods his weary way,
And leaves the world to darkness and to me.

Now fades the glimmering landscape on the sight,
And all the air a solemn stillness holds,
Save where the beetle wheels his droning flight,
And drowsy tinklings lull the distant folds;

Save that from yonder ivy-mantled tower
The moping owl doth to the moon complain
Of such as, wandering near her secret bower,
Molest her ancient solitary reign.

Beneath those rugged elms, that yew-trade's shade,
Where heaves the turf in many a mouldering heap,
Each in his narrow cell forever laid,
The rude forefathers of the hamlet sleep.

The breezy call of incense-breathing morn,
The swallow twittering from the straw-built shed,
The cock's shrill clarion, or the echoing horn,
No more shall rouse them from their lowly bed.

For them no more the blazing hearth shall burn,
Or busy housewife ply her evening care;
No children run to lisp their sire's return,
Or climb his knees the envied kiss to share.

Oft did the harvest to their sickle yield,
Their furrow oft the stubborn glebe has broke,
How jocund did they drive their team afield!
How bowed the woods beneath their sturdy stroke!

Let not ambition mock their useful toil,
Their homely joys and destiny bscure;
Nor grandeur hear with a disdainful smile
The short and simple annals of the poor.

The boast of heraldry, the pomp of power,
And all that beauty, all that wealth e're gave,
Await alike the inevitable hour;—
The paths of glory lead but to the grave.

Nor you, ye proud, impute to these the fault,
If memory o'er their tomb no trophies raise,
Where through the long-drawn aisle and fretted vault
The pealing anthem swells the note of praise.

Can storied urn or animated bust
Back to its mansion call the fleeting breath
Can honor's voice provoke the silent dust,
Or flattery soothe the dull, cold ear of death

Perhaps in this neglected spot is laid
Some heart once pregnant with celestial fire
Hands that the rod of empire might have swayd
Or waked to ecstasy the living lyre;

But knowledge to their eyes her ample page,
Rich with the spoils of time did ne'er unroll
Chill penury repressed their noble rage,
And froze the genial current of the soul.

Full many a gem of purest ray serene
The dark, unfathomed caves of ocean bear;
Full many a flower is born to blush unseen,
And waste its sweetness on the desert air.

Some village Hampden, that with dauntless bre
The little tyrant of his fields withstood;
Some mute, inglorious Milton here may rest;
Some Cromwell, guiltless of his country's blood.

The applause of listening senates to command,
The threats of pain and ruin to despise,
To scatter plenty o'er a smiling land,
And read their history in a nation's eyes,

Their lot forbade: nor circumscribed alone
Their growing virtues, but their crimes co-fined;
Forbade to wade through slaughter to a throne,
And shut the gates of mercy on mankind;

The struggling pangs of conscious truth to hid
To quench the blushes of ingenuous shame,
Or heap the shrine of luxury and pride
With incense kindled at the muse's flame.

Far from the madding crowd's ignoble strife
Their sober wishes never learned to stray;
Along the cool, sequestered vale of life
They kept the noiseless tenor of their way.

Yet e'en these bones from insult to protect,
Some frail memorial still erected nigh,
With uncouth rhymes and shapeless sculptu decked,
Implores the passing tribute of a sigh.

Their name, their years, spelt by the unletter muse,
The place of fame and elegy supply;
And many a holy text around she strews,
That teach the rustic moralist to die.

For who, to dumb forgetfulness a prey,
This pleasing, anxious being e'er resigned,
Left the warm precincts of the cheerful day,
Nor cast one longing, lingering look behind?

some fond breast the parting soul relies,
Some pious drops the closing eye requires;
n from the tomb the voice of nature cries,
E'en in our ashes live their wonted fires.

r thee, who, mindful of the unhonored dead,
Dost in these lines their artless tale relate;
'chance, by lonely contemplation led,
Some kindred spirit shall inquire thy fate,

ply some hoary-headed swain may say;
"Oft have we seen him at the peep of dawn,
ushing with hasty steps the dews away,
To meet the sun upon the upland lawn.

There at the foot of yonder nodding beech,
That wreathes its old, fantastic roots so high,
is listless length at noontide would he stretch,
And pore upon the brook that babbles by.

Hard by yon wood, now smiling as in scorn,
Muttering his wayward fancies, he would rove;
ow drooping, woeful, wan, like one forlorn,
Or crazed with care, or crossed in hopeless love.

One morn I missed him on the 'customed hill,
Along the heath, and near his favorite tree;
nother came—nor yet beside the rill,
Nor up the lawn, nor at the wood was he;

The next, with dirges due, in sad array,
Slow through the church-way path we saw him borne;
pproach and read (for thou canst read) the lay
Graved on the stone beneath yon aged thorn."

THE EPITAPH.

ere rests his head upon the lap of earth,
A youth to fortune and to fame unknown;
ir science frowned not on his humble birth,
And melancholy marked him for her own.

rge was his bounty, and his soul sincere;
Heaven did a recompense as largely send:
e gave to misery all he had—a tear;
He gained from heaven ('twas all he wished) a friend.

o further seek his merits to disclose,
Or draw his frailties from their dread abode:
There they alike in trembling hope repose,)
The bosom of his Father and his God.

THOMAS GRAY.

THE FOOLISH VIOLET.

"I WAS so lonely," a violet said,
As she nestled close to an eagle's breast,
"So tired, too, of the dusk and the dew,
God sent you, I think, to give me rest.
Bear me away to the gates of day,
To heights that forever are glad and green,
And soft on your breast as a bird in its nest,
Let me learn what living and loving mean."

The wind crept cold by the eyrie's edge
That night, in his cavern beside the sea,
The bird slept well, but the pride of the dell,
Forgotten and faded, cried, "Ah! me!
For the sweet, sweet dream by the shadowing stream,
For the lonely life that I used to hate—
For the dusk and the dew so tender and true!"
But the wind made answer, "Too late! too late!"

To-day in the calm of his cold content,
High on the cliffs the bold bird sits,
And never a thought of the harm he wrought
Through the sunny space of his memory flits;
But the wind in glee creeps up from the sea,
And, finding the violet doomed and dead,
Wafts it away from the gates of day,
And buries it down where the dusks are shed.

NEW EVERY MORNING.

EVERY day is a fresh beginning,
Every morn is a world made new;
You who are weary of sorrow and sinning,
Here is a beautiful hope for you;
A hope for me and a hope for you.

All the past things are past and over,
The tasks are done and the tears are shed;
Yesterday's errors let yesterday cover;
Yesterday's wounds which smarted and bled,
Are healed with the healing which night has shed.

Yesterday now is a part of forever,
Bound up in a sheaf which God holds tight,
With glad days and sad days and bad days which never
Shall visit us more with their bloom and their blight,
Their fulness of sunshine or sorrowful night.

Let them go since we cannot relieve them,
Cannot undo and cannot atone;
God in his mercy receive, forgive them,
Only the new days are our own;
To-day is ours and to-day alone.

Here are the skies all burnished brightly,
Here is the spent earth all reborn,
Here are the tired limbs springing lightly
To face the sun and to share with the morn
In the chrism of dew and the cool of dawn.

Every day is a fresh beginning;
Listen, my soul, to the glad refrain,
And spite of old sorrow and older sinning,
And puzzles forecasted and possible pain,
Take heart with the day, and begin again.

SUSAN COOLIDGE.

THE FRIENDSHIP FLOWER.

WHEN first the friendship flower is planted
Within the garden of your soul,
Little of care or thought are wanted
To guard its beauty fresh and whole;
But when the one empassioned age
Has full revealed the magic bloom,
A wise and holy tutelage
Alone can shun the open tomb.

It is not absence you should dread—
For absence is the very air
In which, if sound at root, the head
Shall wave most wonderful and fair;
With sympathies of joy and sorrow
Fed, as with morn and even dews,
Ideal coloring it may borrow
Richer than ever earthly hues.

But oft the plant, whose leaves unsere
Refresh the desert, hardly brooks
The common-peopled atmosphere
Of daily thoughts, and words, and looks;
It trembles at the brushing wings
Of many a careless fashion-fly,
And strange suspicions aim their stings
To taint it as they wanton by.

Rare is the heart to bear a flower,
That must not wholly fall and fade,
Where alien feelings, hour by hour,
Spring up, beset, and overshade;
Better, a child of care and toil,
To glorify some needy spot,
Than in a glad redundant soil
To pine neglected and forgot.

Yet when, at last, by human slight,
Or close of their permitted day,
From the sweet world of life and light
Such fine creations lapse away—
Bury the relics that retain
Sick odors of departed pride—
Hoard as ye will your memory's gain,
But let them perish where they died.

RICHARD M. MILNES.

THE PERFECT WOMAN.

THE perfect woman is as beautiful as she is strong, as tender as she is sensible. She is calm, deliberate, dignified, leisurely. She is gay, graceful, sprightly, sympathetic. She is severe upon occasion and upon occasion playful. She has fancies, dreams, romances, ideas. She organizes neatness, and order, and comfort, but they are merely the foundation whereon rises the temple of her home, beautiful for situation, the joy of the whole earth.

GAIL HAMILTON.

EASY ALL!

"EASY all!" rings out the order,
And the muscles cease to strain,
And the swing of oars in rowlocks
Stops the rhythmical refrain.
And the sinking heart beats freely,
And the spent breath comes again.

"Easy all!" O, joyous mandate
To the strugglers on life's flood,
Be it but a passing respite,
For the brain, and strength, and blood.
Though far distant be the guerdon;
Fame, or wealth, or livelihood!

When the summer sunshine brightens
Grimy street and sullen wall,
From the strips of azure heaven
Seems to come the kindly call;
"Rest a while, ye weary toilers,
Drop your oars, and easy all!"

EXPERIENCE.

A CHILD laid in the grave ere it had known
Earth held delight beyond its mother'
kiss;
A fair girl passing from a world like thi
Unto God's vast eternity alone;
A brave man's soul in one brief instant thrown
To deepest agony from highest bliss;
A woman steeling her young heart to miss
All joy in life, one dear one having flown;
These have I seen; yet happier these, I said,
Than one who, by experience made strong,
Learning to live without the precious dead,
Survive despair, outlive remorse and wrong,
Can say when new grief comes, with unbowed
head,
"Let me not mourn! I shall forget ere long!"

ALICE MARLAND ROLLINS.

MIRANDA.

ADMIRED Miranda!
Indeed the top of admiration; worth
What's dearest to the world! Full many
a lady
I have eyed with best regard; and many a time
The harmony of their tongues hath into bondage
Brought my too diligent ear; for several virtues
Have I liked several women; never any
With so full soul but some defect in her
Did quarrel with the noblest grace she owned
And put it to the foil. But you, O you,
So perfect, and so peerless, are created
Of every creature's best.

WILLIAM SHAKESPEARE.

TWELFTH CENSUS

OF THE

UNITED STATES.

TAKEN IN 1900.

POPULATION OF CITIES HAVING 25,000 INHABITANTS OR MORE IN 1900, ARRANGED ACCORDING TO POPULATION.

Cities.	Population.		Increase. 1890 to 1900.	Cities.	Population.		Increase. 1890 to 1900
	1900	1890	Number.		1900	1890	Number.
Greater New York	3,437,202	2,492,591	944,611	Omaha, Nebr.	102,555	140,452	*37,897
Chicago, Ill.	1,698,575	1,099,850	598,725	Los Angeles, Cal.	102,479	50,395	52,084
Philadelphia Pa.	1,293,697	1,046,964	246,733	Memphis, Tenn.	102,320	64,495	37,825
St. Louis, Mo.	575,238	451,770	123,468	Scranton, Pa.	102,026	75,215	26,811
Boston, Mass.	560,892	448,477	112,415	Lowell, Mass.	94,969	77,696	17,273
Baltimore, Md.	508,957	434,439	74,518	Albany, N. Y.	94,151	94,923	*772
Cleveland, Ohio	381,768	261,353	120,415	Cambridge, Mass.	91,886	70,028	21,858
Buffalo, N. Y.	352,387	255,664	96,723	Portland, Oreg.	90,426	46,385	44,041
San Francisco, Cal.	342,782	298,997	43,785	Atlanta, Ga.	89,872	65,533	24,339
Cincinnati, Ohio	325,902	296,908	28,994	Grand Rapids, M'ch	87,565	60,278	27,287
Pittsburg, Pa.	321,616	238,617	82,999	Dayton, Ohio.	85,333	61,220	24,113
New Orleans, La.	287,104	242,039	45,065	Richmond, Va.	85,050	81,388	3,662
Detroit, Mich.	285,704	205,876	79,828	Nashville, Tenn.	80,865	76,168	4,697
Milwaukee, Wis.	285,315	204,468	80,847	Seattle, Wash.	80,671	42,837	37,834
Washington, D. C.	278,718	230,392	48,326	Hartford, Conn.	79,850	53,230	26,620
Newark, N. J.	246,070	181,830	64,240	Reading, Pa.	78,961	58,661	20,300
Jersey City, N. J.	206,433	163,003	43,430	Wilmington, Del.	76,508	61,431	15,077
Louisville, Ky.	204,731	161,129	43,602	Camden, N. J.	75,935	58,313	17,622
Minneapolis, Minn.	202,718	164,738	37,980	Trenton, N. J.	73,307	57,458	15,849
Providence, R. I.	175,597	132,146	43,451	Bridgeport, Conn.	70,996	48,866	22,130
Indianapolis, Ind.	169,164	105,436	63,728	Lynn, Mass.	68,513	55,727	22,786
Kansas City, Mo.	163,752	132,716	31,036	Oakland, Cal.	66,960	48,682	18,278
St. Paul, Minn.	163,065	133,156	29,909	Lawrence, Mass.	52,559	44,654	17,905
Rochester, N. Y.	162,608	133,896	28,712	New Bedford, Mass.	62,442	40,733	21,709
Denver, Colo.	133,859	106,713	27,146	Des Moines, Iowa.	62,139	50,093	12,046
Toledo, Ohio.	131,822	81,434	50,388	Springfield, Mass.	62,059	44,179	17,880
Allegheny, Pa.	129,896	105,287	24,609	Somerville, Mass.	61,643	40,152	21,491
Columbus, Ohio	125,560	88,150	37,410	Troy, N. Y.	60,651	60,956	*305
Worcester, Mass.	118,421	84,655	33,766	Hoboken, N. J.	59,364	43,648	15,716
Syracuse, N. Y.	108,374	88,143	20,231	Evansville, Ind.	59,007	50,756	8,251
New Haven, Conn.	108,027	81,298	26,729	Manchester, N. H.	56,987	44,126	12,861
Paterson, N. J.	105,171	78,347	26,824	Utica, N. Y.	56,383	44,007	12,376
Fall River, Mass.	104,863	74,398	30,465	Peoria, Ill.	56,100	41,024	15,076
St. Joseph, Mo.	102,979	52,324	50,655	Charleston, S. C.	55,807	54,955	852

* Decrease.

Cities.	Population.		Increase. 1890 to 1900	Cities.	Population.		Increase 1890 to 1900
	1900	1890	Number.		1900	1890	Number
Savannah, Ga. . .	54,244	43,189	11,055	McKeesport, Pa. .	34,227	20,741	13,486
S't Lake City, Utah	53,531	44,843	8,688	Springfield, Ill. . .	34,159	24,963	9,196
San Antonio, Tex.	53,321	37,673	15,648	Chelsea, Mass. . .	34,072	27,909	6,163
Duluth, Minn. . . .	52,969	33,115	19,854	Chester, Pa. . . .	33,988	20,226	13,762
Erie, Pa.	52,733	40,634	12,099	York, Pa.	33,708	20,793	12,915
Elizabeth, N. J. . .	52,130	37,764	14,366	Malden, Mass. . .	33,664	23,031	10,633
Wilkesbarre, Pa. .	51,721	37,718	14,003	Topeka, Kans. . .	33,608	31,007	2,601
Kansas City, Kans.	51,418	38,316	13,102	Newton, Mass. . .	33,587	24,379	9,208
Harrisburg, Pa. . .	50,167	39,385	10,782	Sioux City, Iowa.	33,111	37,806	*4,695
Portland, Me. . . .	50,145	36,425	13,720	Bayonne, N. J. . .	32,722	19,033	13,689
Yonkers, N. Y. . .	47,931	32,033	15,898	Knoxville, Tenn. .	32,637	22,535	10,102
Norfolk, Va.	46,624	34,871	11,753	Chattanooga, Tenn.	32,490	29,100	3,390
Waterbury, Conn. .	45,859	28,646	17,213	Schenectady, N. Y.	31,682	19,902	11,780
Holyoke, Mass. . .	45,712	35,637	10,075	Fitchburg, Mass. .	31,531	22,037	9,494
Fort Wayne, Ind. .	45,115	35,393	9,722	Superior, Wis. . .	31,091	11,983	19,108
Youngstown, Ohio	44,885	33,220	11,665	Rockford, Ill. . . .	31,051	23,584	7,467
Houston, Tex. . .	44,633	27,557	17,076	Taunton, Mass. . .	31,036	25,448	5,588
Covington, Ky. . .	42,938	37,371	5,567	Canton, Ohio . . .	30,667	26,189	4,478
Akron, Ohio . . .	42,728	27,601	15,127	Butte, Mont. . . .	30,470	10,723	19,747
Dallas, Tex.	42,638	38,067	4,571	Montgomery, Ala.	30,346	21,883	8,463
Saginaw, Mich. . .	42,345	46,322	*3,977	Auburn, N. Y. . .	30,345	25,858	4,487
Lancaster, Pa. . .	41,459	32,011	9,448	East St. Louis, Ill.	29,655	15,169	14,486
Lincoln, Nebr. . . .	40,169	55,154	*14,985	Joliet, Ill.	29,353	23,264	6,089
Brockton, Mass. .	40,063	27,294	12,769	Sacramento, Cal. .	29,282	26,386	2,896
Binghampton, N.Y.	39,647	35,005	4,642	Racine, Wis. . . .	29,102	21,014	8,088
Augusta, Ga. . . .	39,441	33,300	6,141	La Crosse, Wis. . .	28,895	25,090	3,805
Pawtucket, R. I. . .	39,231	27,633	11,598	Williamsport, Pa. .	28,757	27,132	1,625
Altoona, Pa. . . .	38,973	30,337	8,636	Jacksonville, Fla.	28,429	17,201	11,228
Wheeling, W. Va. .	38,878	34,522	1,356	Newcastle, Pa. . .	28,339	11,600	16,739
Mobile, Ala. . . .	38,469	31,076	7,393	Newport, Ky. . . .	28,301	24,918	3,383
Birmingham, Ala. .	38,415	26,178	12,237	Oshkosh, Wis. . .	28,284	22,836	5,448
Little Rock, Ark. .	38,307	25,874	12,433	Woonsocket, R. I.	28,204	20,830	7,374
Springfield, Ohio. .	38,253	31,895	6,358	Pueblo, Colo. . . .	28,157	24,558	3,599
Galveston, Tex. . .	37,789	29,084	8,705	Atlantic City, N. J.	27,838	13,055	14,783
Tacoma, Wash. . .	37,714	36,006	1,708	Passaic, N. J. . . .	27,777	13,028	14,749
Haverhill, Mass. .	37,175	27,412	9,763	Bay City, Mich. . .	27,628	27,839	*211
Spokane, Wash. .	36,848	19,922	16,926	Fort Worth, Tex. .	26,688	23,076	3,612
Terre Haute, Ind.	36,673	30,217	6,456	Lexington, Ky. . .	26,369	21,567	4,802
Dubuque, Iowa . .	36,297	30,311	5,986	Gloucester, Mass. .	26,121	24,651	1,470
Quincy, Ill.	36,252	31,494	4,758	South Omaha, Neb.	26,001	8,062	17,939
South Bend, Ind. .	35,999	21,819	14,180	New Britain, Conn.	25,998	16,519	9,479
Salem, Mass. . . .	35,956	30,801	5,155	Council Bluffs, Iwa.	25,802	21,474	4,328
Johnstown, Pa. . .	35,936	21,805	14,131	Cedar Rapids, Iwa.	25,656	18,020	7,636
Elmira, N. Y. . . .	35,672	30,893	4,799	Easton, Pa.	25,238	14,481	10,757
Allentown, Pa. . .	35,416	25,228	10,188	Jackson, Mich. . .	25,180	20,798	4,382
Davenport, Iowa .	35,254	26,872	8,382				

* Decrease.

POPULATION OF THE UNITED STATES

DURING THE LAST SEVENTY YEARS.

States and Territories.	1830	1840	1850	1860	1870	1880	1890	1900
Alabama	309,527	590,756	771,623	964,201	996,992	1,262,505	1,513,017	1,828,697
Arizona	....	....	....	....	9,658	40,440	59,620	122,931
Arkansas	30,388	97,574	209,897	435,450	484,471	802,525	1,128,179	1,311,564
California	....	....	92,597	379,994	560,247	864,694	1,208,130	1,485,053
Colorado	....	....	....	34,277	39,864	194,327	419,198	539,700
Connecticut	297,675	309,978	370,792	460,147	537,454	622,700	746,258	908,355
Dakota	....	....	....	4,837	14,181	135,177	....	....
Delaware	76,748	78,085	91,532	112,216	125,015	146,608	168,493	184,735
District of Columbia	39,834	43,712	51,687	75,080	131,700	177,624	230,392	278,718
Florida	34,730	54,477	87,445	140,424	187,748	269,493	391,422	528,542
Georgia	516,823	691,392	906,185	1,057,286	1,184,109	1,542,180	1,837,353	2,216,331
Idaho	....	....	....	....	14,999	32,610	84,385	161,772
Illinois	157,445	476,183	851,470	1,711,951	2,539,891	3,077,871	3,826,351	4,821,550
Indiana	343,031	685,866	988,416	1,350,428	1,680,637	1,978,301	2,192,404	2,516,462
Iowa	....	43,112	192,214	674,913	1,194,020	1,624,615	1,911,896	2,231,853
Kansas	....	....	....	107,206	364,399	996,096	1,427,096	1,470,495
Kentucky	687,917	779,828	982,405	1,155,684	1,321,011	1,648,690	1,858,635	2,147,174
Louisiana	215,739	352,411	517,762	708,002	726,915	939,946	1,118,587	1,381,625
Maine	399,455	501,793	583,169	628,279	626,915	648,936	661,086	694,466
Maryland	447,040	470,019	583,034	687,049	780,894	934,943	1,042,390	1,190,050
Massachusetts	610,408	737,699	994,514	1,231,066	1,457,351	1,783,085	2,238,943	2,805,346
Michigan	31,639	212,267	397,654	749,113	1,184,059	1,636,937	2,093,889	2,420,982
Minnesota	....	....	7,077	172,023	439,706	780,773	1,301,826	1,751,394
Mississippi	136,621	375,651	606,526	791,305	827,922	1,131,597	1,289,600	1,551,270
Missouri	140,455	383,702	682,044	1,182,012	1,721,295	2,168,380	2,679,184	3,106,665
Montana	....	....	....	....	20,595	39,159	132,159	243,329
Nebraska	....	....	....	28,841	122,993	452,402	1,058,910	1,068,539
Nevada	....	....	....	6,857	42,491	62,266	45,761	42,335
New Hampshire	269,328	284,574	317,976	326,073	318,300	346,991	376,530	411,588
New Jersey	320,823	373,306	489,555	672,035	906,096	1,131,116	1,444,933	1,883,669
New Mexico	....	....	61,547	93,516	91,874	119,565	153,593	195,310
New York	1,918,608	2,428,921	3,097,394	3,880,735	4,382,759	5,082,871	5,997,853	7,268,012
North Carolina	707,987	753,419	869,039	992,622	1,071,361	1,399,750	1,617,947	1,893,810
North Dakota	....	....	....	....	....	....	182,719	319,146
Ohio	937,903	1,519,467	1,980,329	2,339,511	2,665,260	3,198,062	3,672,316	4,157,545
Oklahoma	....	....	....	....	....	....	61,834	398,245
Oregon	....	....	13,294	52,465	90,923	174,768	313,767	413,536
Pennsylvania	1,348,233	1,724,033	2,311,786	2,906,215	3,521,951	4,282,819	5,258,014	6,302,115
Rhode Island	97,199	108,830	147,545	174,620	217,353	276,531	345,506	428,556
South Carolina	581,185	594,398	668,507	703,708	705,606	995,577	1,151,149	1,340,316
South Dakota	....	....	....	....	....	....	328,808	401,570
Tennessee	681,904	829,210	1,002,717	1,109,801	1,258,520	1,542,359	1,767,518	2,020,616
Texas	....	....	212,592	604,215	818,579	1,591,749	2,235,523	3,048,710
Utah	....	....	11,380	40,273	86,786	143,963	207,905	276,749
Vermont	280,652	291,948	314,120	315,098	330,551	332,286	332,422	343,641
Virginia	1,211,405	1,239,797	1,421,661	1,596,318	1,225,163	1,512,565	1,655,980	1,854,184
Washington	....	....	....	11,594	23,955	75,116	349,390	518,103
West Virginia	....	....	....	....	442,014	618,457	762,704	958,800
Wisconsin	....	30,945	305,391	775,881	1,054,670	1,315,497	1,686,880	2,069,042
Wyoming	....	....	....	....	9,118	20,789	60,705	92,531
Alaska	....	....	....	....	....	....	32,052	63,441
Hawaii	....	....	....	....	....	....	89,990	154,001
Indian Territory	....	....	....	....	....	....	180,182	391,960
Total	12,866,020	17,069,453	23,111,876	31,443,221	38,558,371	50,155,783	62,924,474	76,215,129

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